SELECTED WATER RESOURCES ABSTRACTS

VOLUME 8, NUMBER 5
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A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

USE OF THE NONPOLAR ANALOG MODEL IN INFERRING THE EXTENT OF ORDERING AROUND SOLUTE MOLECULES IN WATER,
Oklahoma Univ., Norman.
S. D. Christian.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 026, $3.25 in paper copy, $2.25 in microfiche. Completion Report, Oklahoma Water Resources Research Institute, Stillwater (1974). 20 p, 5 fig, 1 tab, 15 ref. OWRR A-046-OKLA(2). 14-31-0001-3836.

Descriptors: *Thermodynamics, Solutes, Ice, *Molecular structure, *Aqueous solutions, *Analog models, Model studies, *Water structure, *Water properties, *Statistical methods, Free energy, Energy.

Thermodynamic and statistical mechanical methods have been applied to determine the nature of the water region surrounding solute molecules in aqueous systems. Results are consistent with a model in which each nonpolar molecule or group is surrounded by a closely packed water layer, one molecule thick, having properties similar to that of ice. Calculations of energy and free energy of ordering are made for numerous nonpolar solutes.
W75-02508

2. WATER CYCLE

2A. General

RAINFALL-RUNOFF MODELS USING DIGITAL COMPUTERS,
New South Wales Inst. of Technology, Kensington (Australia). School of Civil Engineering.
A. Pattison, and T. A. McMahon.
Civil Engineering Transactions, Vol CE15, No 1-2, p 1-4, 1973. 2 fig, 1 tab, 11 ref.

Descriptors: *Rainfall-runoff relationships, *Model studies, *Digital computers, Australia, Hydrology, Mathematical models, Computer programs.
Identifiers: Stanford model, SMHEA model, Representative Basin model, Monash model, Boughton model.

Five models of the rainfall-runoff process are reported in the literature as having been developed in Australia and/or tested using Australian data, which include the Stanford, SMHEA, Representative Basin, Monash, and the Boughton. Of these, the Stanford Watershed Model Mark IV is by far the most effective in terms of the type of information which can be simulated and the accuracy of its operation. However, it suffers the special disadvantages of not being readily available in Australia together with its need for a high level of operator expertise and extensive data requirements. A detailed review of the Boughton model is presented as only this model seems to be suitable at the present time for widescale application in Australia. Its structure is not complicated, its operation is straightforward, numerous applications of the model have been made, and its results appear to be reliable when used to determine aggregates of runoff over monthly (or greater) periods. However, as with other models, the Boughton rainfall-runoff model can be applied with a high level of confidence only when adequate data are available for the determination of model parameters and for the adequate testing of these parameters. (Jones-Wisconsin)
W75-02260

SIMULATION OF THE HYDROLOGIC CYCLE USING ATMOSPHERIC WATER VAPOR TRANSPORT DATA,
Connecticut Univ., Storrs.
P. Magyar.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 032, $7.50 in paper copy, $2.25 in microfiche. Ph.D. dissertation, 1973. 201 p, 35 tab, 55 fig, 54 ref, 3 append. OWRR A-033-CONN(1). 14-31-0001-3807.

Descriptors: *Drainage areas, *Hydrologic cycle, *Simulation analysis, Precipitation(Atmospheric), Precipitable water, Runoff, Storage, United States, *Statistical methods, Evapotranspiration, Water vapor, Mathematical studies, Model studies, Hydrologic data, Meteorology.
Identifiers: Computer simulation, Atmospheric divergence.

Components of the hydrologic cycle are quantitatively evaluated. Though the components of precipitation and runoff can be measured with considerable accuracy, total surface and subsurface storage and evapotranspiration cannot be determined properly. Investigations indicated that adequate information can be extracted from existing meteorological observations for smaller catchment areas from 20,000 to 56,000 sq. miles, areas which are important for large scale water resources planning purposes. In this investigation the Program for Small Areas performed data processing and screening on an IBM 360 computer system for 76 study areas covering almost the entire continental United States. Introducing a three-phase adjustment technique, the various components of the local hydrologic cycle were calculated and their reliability checked. By standardization, the extended simultaneous time series were separated into periodic-deterministic and random-stochastic variables. An empirical probability distribution was fitted to the random sub-components to simulate stochastic properties and to determine statistical parameters of the calculated stochastic variables. Using the theory of probability of occurrence to selected return periods, extreme and characteristic values of the random part of hydrologic time series were determined for use in water resources planning after retransformation into composite (deterministic plus stochastic) variables.
W75-02346

THE SIGNIFICANCE OF GEOLOGY IN SOME CURRENT WATER RESOURCE PROBLEMS, CANTERBURY PLAINS, NEW ZEALAND,
New Zealand Geological Survey, Christchurch.
D. D. Wilson.
Journal of Hydrology (New Zealand), Vol 12, No 2, p 103-118, 1973. 5 fig, 1 tab, 10 ref.

Descriptors: *Surface-groundwater relationships, *Geohydrologic units, *Hydrogeology, Base flow, Water supply, Streamflow, Recharge, Glacial aquifers, Alluvial aquifers, Specific capacity, Water wells, Transmissivity, Aquicludes, Water yield, Water pollution, Permeability, Infiltration, Water table, Water table aquifers, Quaternary period, Precipitation(Atmospheric), Potentiometric level, Groundwater mining, Artificial recharge, Seepage, Saline water intrusion.
Identifiers: *Pre-quaternary sediments, *Volcanic rocks, *Periglacial outwash, *New Zealand.

Data from nearly 5000 wells show that high-yeilding gravel aquifers are present in the lower and middle reaches of the Canterbury Plains, but rarely in upper reaches. Gravel sorting should improve to the east with distance from the foothills and therefore a gradual increase in permeability should be expected, but not the sudden increases implied by increases in well yields. The increases are probably due to enhanced recharge by influent seepage, suggested by water-table contours and proved in some cases by gauged river losses. Influent seepage appears to take place mainly where rivers flow in post-glacial alluvium and the geological boundary between the alluvium and older glacial outwash gravels broadly separates a low-yield inland plains area, where irrigation must depend on surface water, from a high-yield coastal plains area where groundwater can in many places be used. While flow patterns can be deduced from water-table contours in areas of unconfined water, they must be deduced from pressure differences in confined aquifers. Pressure variations under Christchurch show that flow directions at all levels down to 120 m are towards an area underlying the Christchurch Estuary. This fact may help in monitoring any sea-water intrusion. Other risks to Christchurch were discussed. (Schicht-ISWS)
W75-02383

WATER FOR THE HUMAN ENVIRONMENT, VOLUME II, COUNTRY REPORTS.
Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois. 510 p.

Descriptors: Water resources, *Conferences, *Environment, *Water resources development, *Planning, *Foreign countries, Africa, Asia, Europe, Canada, South America, United States, Australia.
Identifiers: Middle East, Central America, New Zealand.

Water for the human environment was discussed at a world congress held at Chicago in 1973. Volume II contains status reports on water resources activities and development in countries of Africa, Asia, Middle East and Oceania, Europe, and the Americas. (See W75-02441 thru W75-02469) (Humphreys-ISWS)
W75-02440

STATUS OF WATER RESOURCES IN EGYPT,
F. N. Mikhail.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 3-18, 7 fig.

Descriptors: Water resources, *Water resources development, *Africa, Groundwater resources, Surface waters, Water supply, Water supply development, River basin development, Irrigation, Reservoirs, Artesian wells, Water wells, Desalination, Foreign countries.
Identifiers: *Egypt.

The Egyptian government's objective is to increase national income from agricultural and industrial activity, and water resources development projects are expected to enhance the achievement of increased income. The development programs and achievements discussed were: (1) the development, conservation and efficient utilization of its surface water, namely the development of the Nile River resources; (2) the development and utilization of groundwater under the valley proper, through efficient pumping techniques that will add to its water resources without endangering the underground reservoir (3) development and proper exploitation of the artesian water in the western desert and its oases, which is known as the New Valley Project; and (4) the desalinization of the water from the Mediterranean and Red Seas to irrigate the coastal districts lying on them. (See also W75-02440) (Humphreys-ISWS)
W75-02441

THE STATUS OF KENYA'S WATER RESOURCES AND THEIR DEVELOPMENT,
Nairobi Univ., Kenya. Dept. of Physical Geography.
F. F. Ojany.

In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 19-44, 10 fig, 5 tab, 13 ref.

Descriptors: Water resources, *Water resources development, *Africa, Climatic data, Surface waters, Groundwater resources, Water pollution, Watersheds(Basins), Hydrogeology, Aquifers, Water quality, Management, Water conservation, Hydrologic data.
Identifiers: *Kenya.

The physiography of Kenya was examined briefly to provide proper understanding of the country's climate and the related major surface water shortage. The inadequacy of surface water was shown to be one of the main constraints to development and as the main limiting factor in the use of much of the northern half of the country. Population distribution and modernization in Kenya shows too much dependence on the small region that receives higher rainfall. Studies of rainfall reliability in the country have shown that only 15% of the country can expect to receive at least 30 inches (760 mm) of rainfall in every four out of five years. This fact underlies the urgent need for Kenyans to expand into the relatively drier parts of the country. Because of lack of enough water, the government has initiated a program of planned water development for the whole country intended to conserve the water catchment areas; to assess and develop fully the groundwater resources to ensure that the rapidly expanding industrial and urban water requirements are met; and to supply good quality piped water to all the inhabitants, including the ill-served rural areas. The government is aware that this task must be based on systematic study and storage of all the relevant hydrological data. It was shown that much progress has been made, although lack of finances and trained manpower are some of the main problems for which solutions must be found to ensure success. (See also W75-02440) (Humphreys-ISWS)
W75-02442

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN TANZANIA,
Ministry of Water Development and Power, Dar es Salaam (Tanzania).
F. K. Lwegarulila.
In: Water for the Human Environment, Volume II, Country Reports, Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 45-58, 1 fig.

Descriptors: Water resources, *Water resources development, Africa, Water supply, Rural areas, Urban drainage, Water law, Hydrology, Hydrologic data, Networks, Irrigation, Agriculture, Land use, Planning, Training, Hydroelectric power, Administrative agencies, Foreign countries.
Identifiers: *Tanzania.

Systematic development of the water resources of Tanzania was started only in recent years, so that generally speaking the settlement pattern of Tanzania still indicates the availability of natural surface water supplies. A Ministry of Water Development and Power deals with planning, construction, operation, and maintenance of all water development projects. The water resources development program includes water resource master planning and construction of large dams to increase irrigation potential, produce power, and control floods. Rural water supply development is high on the priority list. (See also W75-02440) (Humphreys-ISWS)
W75-02443

WATER RESOURCES DEVELOPMENT IN BANGLADESH,
Bangladesh Flood Control, Irrigation and Power, Dacca.
B. M. Abbas.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 63-75, 2 fig.

Descriptors: Water resources, *Water resources development, *Asia, Planning, River basin development, Flood control, Estuaries, Land reclamation, Drainage, Irrigation, International joint commission, River basins, Multiple-purpose projects, Agriculture, Navigation, Saline water intrusion, Water utilization.
Identifiers: *Bangladesh.

The three major programs in the field of water control in Bangladesh are: (1) river control; (2) estuary closures; and (3) land reclamation, drainage and irrigation. A large number of multipurpose projects have been prepared, some were executed and others are ready for implementation. All the major rivers of Bangladesh have their headwaters outside the country. Any developments in the upper reaches of the rivers that flow from India affect Bangladesh. Further best results could be obtained only if the river basins are developed on a comprehensive and coordinated basis. India and Bangladesh have, therefore, set up a Joint Rivers Commission to make joint studies and take joint action in the field of flood control, river basin development, and the development of hydro-electric power and irrigation on the common rivers between the two countries. (See also W75-02440) (Humphreys-ISWS)
W75-02444

WATER RESOURCES ACTIVITIES IN TAIWAN, REPUBLIC OF CHINA,
Taiwan Water Resources Planning Commission. Taipei.
L. T. Hsueh.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 76-96, 5 fig, 14 tab.

Descriptors: Water resources, *Water resources development, Planning, Irrigation, Rainfall, Economics, Flood control, Water supply, Water pollution control, Surface waters, Groundwater, Reservoirs, Water utilization, Water quality.
Identifiers: *Taiwan(Republic of China).

Taiwan has abundant rainfall, but its distribution is quite uneven and only 21% (11,394 million cubic meters) are available as river flows in the dry season from November to April. All rivers are short, steep, and non-navigable. The combination of steep and narrow valleys, weak geology, and floods and sediments places a limit on potential storage sites, and makes the rivers rather difficult to regulate and control. The water resources of both surface and ground waters have been developed to a certain extent for different purposes, however, without consideration of long-range and regional planning. Owing to the population increase and rapid growth of industry and urbanization, the water requirements for public water supply and industrial use have been rapidly increasing every year. At present there are problems of competition for water among different users, with land subsidence induced by excessive extraction of groundwater in the Taipei basin, and water pollution of most rivers due to increasing waste disposal from urbanization and industrial expansion. Taiwan is divided into seven water resources regions for further planning to meet the furture demand for water quantity and water quality. There is no prospect of water shortage on an island wide scale, but efforts should be given to mitigate all losses and wastes. (See also W75-02440) (Scott-ISWS)
W75-02445

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN INDIA,
Ministry of Irrigation and Power, New Delhi (India).
K. L. Rao.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 97-117, 6 fig.

Descriptors: Water resources, *Water resources development, *Asia, Climatology, Groundwater resources, Surface waters, River basin development, Comprehensive planning, Inter-basin transfers, Multiple-purpose projects, Planning, Water utilization, Agriculture, Irrigation, Water supply, Flood control, Drainage, Training, Education, Management, Foreign countries.
Identifiers: *India, National water grid.

The water resources activities in India are among the most important sectors of national developmental activities. The irrigation potential expected by 1974 would be double that available in 1951. The major constraint in the development of irrigation beyond about 50% of the cropped area is expected to be the limited availability of water resources. Technological advances such as the formulation of river grids which enable transfer of water from surplus regions to needy regions; adoption of practices of scientific water management; integrated command area development, conjunctive use of ground and surface water, evolution of integrated overall river basin and regional plans; elimination of present losses to the extent feasible; and exploration of better conservation techniques have all to be adopted in the future for the maximum utilization of scarce and precious water resources. (See also W75-02440) (Humphreys-ISWS)
W75-02446

PRESENT STATUS OF WATER RESOURCES DEVELOPMENT IN INDONESIA,
Indonesian Inst. of Sciences, Djakarta.
S. Doelhomid.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 118-130, 1 tab, 7 ref.

Descriptors: Water resources, *Water resources development, *Asia, River basin development, Planning, Water supply, Irrigation, Agriculture, Administration, Management, Education, Multiple-purpose projects, Industrial plants, Water utilization, Climatology, Flood control, Sewerage, Hydroelectric power.
Identifiers: *Indonesia.

Indonesia has abundant water resources, but they are unevenly distributed over the year because of the half yearly wet and dry monsoons. In the next decades, there is enough water in Java to improve and develop agriculture. At the time that industries and urban areas will need more water, it is expected that agricultural development in Sumatra, Kalimantan, and Sulawesi would be able to replace agriculture in Java step by step, so that the irrigation water can be transfered for industrial and domestic purposes. At the same time the industries can provide employment for the farmers who have to leave the agricultural sector. The Indonesian Government has started with the overall development of the water resources of : (1) the most important river basins of the most fertile and densely populated island of Java, which is inhabited by 65% of Indonesia's population; (2) the islands of Bali, and Lombok, the most densely populated islands after Java, which are situated in the driest eastern part of Indonesia; and (3) some basins in Sumatra, Kalimantan, and Sulawesi, which were planned as rice producing centers, and imigration areas for the population from Java, Bali, and Lombok. (See also W75-02440) (Humphreys-ISWS)

W75-02447

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN MALAYSIA,
Drainage and Irrigation Dept., Kuala Lumpur (Malaysia).
J. G. Daniel, and C. I. Cheong.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 131-145.

Descriptors: Water resources, *Water resources development, *Asia, Planning, Management, Hydrologic aspects, Irrigation, Water supply, Hydroelectric power, Flood control, Soil erosion, Pollution abatement, Droughts.
Identifiers: *Malaysia.

Water resources activities in Malaysia cover a wide range and are assigned to a number of government departments and agencies. They cover water resources assessment, water resources planning and development, water resources management, and water resources research. Under the Second Malaysia Plan (1971-1975), the government has made substantial financial provision for the expansion of expansion of hydrological activities and for the strengthening of hydrological services in the country. The present status of water resources development and management in the fields of irrigation, industrial, domestic and municipal water supply, hydropower, and flood mitigation were reviewed. The major water problems in Malaysia arising from flood, soil erosion, pollution, and drought were outlined. The details of the programs in progress for the upgrading of hydrological services in the country were briefly discussed. Work has been started to obtain and monitor needed systematic data pertaining to water resources on a long-term basis while steps are being taken to resolve some of the more urgent problems keeping in view the need to evolve suitable solutions in the context of the total environment. (See also W75-02440) (Scott-ISWS)
W75-02448

WATER RESOURCES STATUS REPORT ON PAKISTAN,
M. Khan.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 146-160, 2 fig, 3 tab.

Descriptors: Water resources, *Water resources development, *Asia, Irrigation, Surface waters, River basin development, Comprehensive planning, Groundwater resources, Management, Administration, Education, Training, Manpower, Agriculture, Land resources.
Identifiers: *Pakistan.

The principal water resources of Pakistan are the surface water of the Indus river and its tributaries and the direct rainfall on the agricultural lands. The groundwater reservoir created primarly by surface water percolation from irrigation over a long period is another potential source. The predominently agrarian economy is almost wholly dependent on irrigation which remains the highest and the most important charge on its water resources. Therefore, attention was focused on the total use of irrigated agriculture including sociological inputs for water resources management. Other water uses such as power generation, domestic and industrial consumption, mineral processing, fisheries development, and recreation are also gaining importance. (See also W75-02440) (Humphreys-ISWS)
W75-02449

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN SRI LANKA,
Mahaweli Development Board (Sri Lanka).
H. de S. Manamperi.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 174-185, 1 fig, 9 ref.

Descriptors: Water resources, *Water resources development, Planning, Water utilization, Asia, Irrigation, Water supply, Multiple-purpose projects, Agriculture, Hydrologic data, Groundwater, Reservoirs, Economics.
Identifiers: *Ceylon(Sri Lanka).

The physical setting and economic conditions of Sri Lanka were described as well as its water resources activities and development. The country is divided into two zones. The south-western quadrant of the island receives rain during both the South-West Monsoon (April-September) and the North-East Monsoon (October-March) and forms the West Zone. The Dry Zone receives rainfall only during the period October-February and thus requires large storage works. Because annual floods cause considerable damage to agricultural production, proposals are being formulated for flood control works on the Kalu, Gin, and Nilwala river basins. Investigations are being conducted for utilizing groundwater for subsidary crops and some domestic supply schemes, and irrigation facilities have been installed in the north-western part of the Dry Zone. Construction of storage reservoirs for irrigation and domestic supply has been practices since 250 B.C. Nearly all the ancient irrigation reservoirs and two ancient trans-basin diversion canals have been reconditioned and improved and new works have been constructed. Yield response to water-soil-fertilizer relationships of the rice crops are being determined at experimental plots to improve the water management practices at the farm level. The present yield of rice could be nearly doubled by improving water management and farming practices. Attempts to improve the economic efficiency of the water resources activities generally show that multiple-purpose projects yielded the maximum benefits. (See also W75-02440) (Scott-ISWS)
W75-02450

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN THAILAND,
Royal Irrigation Dept., Bangkok (Thailand). Hydrology Div.
D. Jaraswathana, and C. Phiancharoen.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 186-194.

Descriptors: Water resources, *Water resources development, *Asia, Surface waters, Groundwater resources, Environmental effects, River basin development, Planning, Irrigation, Agriculture, Management.
Identifiers: *Thailand.

Thailand is essentially an agricultural country. Formulation of a water resources development scheme for irrigation was started in the early 1900's. Development of water resources for irrigation has priority although the use of water for other purposes is also recognized. A general view was presented on the status of water resources activities and development in Thailand for surface and ground water resources. Activities in hydrology include: (1) procurement of basic data on precipitation, river discharge, sedimentation, evaporation, and other related climatic data; (2) analyses of such basic data to learn about natural phenomena of the waters, their occurrences, distribution and circulation, and their properties and reactions to environments; and (3) application and utilization of this knowledge in planning, management, and operation of water resources development projects. Groundwater is generally available and has played a less important role in solving water problems than its availability indicates. Its primary use at present is for domestic supplies in rural communities and some urban areas. Although the water resources have been utilized with developments for both surface and groundwater, a great potential of water resources remains to be developed. The rapidly rising demands of water for various purposes call for careful consideration in planning and management. To manage the river basins more efficiently and make maximum use of the water resources are presently the primary goals of Thailand. (See also W75-02440) (Humphreys-ISWS)
W75-02451

WATER RESOURCES DEVELOPMENT IN IRAN,
Ministry of Water and Power, Tehran (Iran).
I. Vahidi.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 197-209, 1 fig, 5 tab.

Descriptors: *Water resources development, *Water demand, *Water management(Applied), Water resources, Administration, Planning, Water utilization, Hydrology, Water policy, Construction, Water distribution(Applied).
Identifiers: *Middle East, *Iran.

The rapidly increasing demand for water in Iran is due to population growth, industrialization, and higher living standards. Iran, a large country of 30 million people, is in an arid zone with little rainfall and a wide range of temperatures, therefore, it has limited water resources. Information was given about the utilization and development of these scarce water resources. As the efficient use of water is vital to the country's development, the resources have been nationalized. Details of both the administration and of the construction program for reservoir dams, irrigation systems, and industrial water supplies were given. (See also W75-02440) (Scott-ISWS)
W75-02452

WATER RESOURCES AND DEVELOPMENT IN IRAQ,
Scientific Research Council, Baghdad (Iraq).
N. A. Kadir.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 210-223, 5 fig.

Descriptors: Water resources, *Water resources development, *Planning, Management, River flow, Irrigation, Flood control, Groundwater resources, Education, Administration.
Identifiers: *Middle East, *Iraq.

Water from the Euphrates and Tigris Rivers constitutes the main source of water in Iraq, and is used for municipal, industrial, navigational, and primarily irrigational purposes. The marshes and lakes are fed by river water and therefore cannot be considered as independent water sources. Subsurface water, including wells and springs, is the second, but so far minor, source of water used mainly for municipal purposes. Modern scientific development of water resources in Iraq started after the turn of this century. Proper gauging and recording of the river flows were begun. Structures to control and regulate the flow were built consecutively for irrigation purposes together with the corresponding irrigation systems. Several dams and reservoirs for flood protection and storage purposes were built during the last two decades. Groundwater explorations were made for utilizing groundwater at locations distant from

rivers, both in the foothills and in desert areas. The present five year plan of national development, laid down and started by the Government in 1970, has included a vast development program for the water resources, the cost of which amounts to over 20% of the allocation set for the plan. This development program includes irrigation, drainage, flood control, storage, hydroelectric power, water supply, groundwater, and related research projects. A new master plan for a full control and utilization of the river waters is under study to serve the local present and future needs. (See also W75-02440) (Scott-ISWS)
W75-02453

A SURVEY OF WATER RESOURCES DEVELOPMENT, UTILIZATION AND MANAGEMENT IN ISRAEL,
Ministry of Agriculture, Jerusalem (Israel). Hydrological Service.
M. Jacobs, and Y. Litwin.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 224-247, 6 fig, 3 ref.

Descriptors: *Water resources development, *Water utilization, *Water management(Applied), Groundwater, Surface water, Water resources, Administration, Legislation, Education, Research and development, Water demand, Planning, Arid lands.
Identifiers: *Middle East, *Israel.

Israel's water resources and its experience in development, utilization, and management of these resources were outlined. Special emphasis was given to problems arising from climatic and geographic conditions as reflected by the scarcity of water. Included was a description of the administrative and legal structure needed for the efficient management of the water resources. A short survey was given of the institutions involved in education and research in the field of water resources. (See also W75-02440) (Scott-ISWS)
W75-02454

EFFECT OF OIL REFINERY EFFLUENT ON THE SHALLOW GRAVEL AQUIFER IN ZERQA AREA-JORDAN,
Natural Resources Authority, Amman (Jordan).
For primary bibliographic entry see Field 5B.
W75-02455

THE PROGRESS OF DESALTING TECHNOLOGY IN KUWAIT,
Kuwait Water Resources Development Centre.
For primary bibliographic entry see Field 3A.
W75-02456

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN TURKEY,
State Hydraulic Works, Ankara (Turkey). Investigation and Planning Dept.
A. Unver, and S. Oztek.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 309-318, 4 tab.

Descriptors: Water resources, *Water resources development, Water policy, Administration, Planning, Economics, Evaluation, Long-term planning, Institutions, Water utilization, Irrigation, Agriculture, Water pollution, Organizations, Hydrology.
Identifiers: *Middle East, *Turkey.

Development of water resources is generally made by the State and several governmental organizations have been established for this purpose. Surface and ground water potential is about 88 billion cubic meters per year. Presently, almost one-eighth of this potential is used for different purposes. According to studies, 473 dams should be built in order to regulate surface runoff. After that, irrigation of 5,450,000 hectares, flood control on 331,000 hectares, delivery of 1.4 billion cubic meters per year of water as municipal and industrial water supply, and generation of 73.2 billion Kwh of energy will be achieved. Turkey is divided into 26 river basins, and the reconnaissance level studies are completed. In many of these basins, covering the most important parts of the basin, master-plan level studies based on exploratory data have been completed and reports prepared. More than 300 separate development projects about water and land resources have been worked on and feasibility reports for most of them have been prepared. A detailed summary of hydrometrical and hydrometeorological stations in operation were tabulated. Data collection concerning water pollution, especially in critical regions of the country has been initiated. (See also W75-02440) (Humphreys-ISWS)
W75-02457

AUSTRALIAN WATER QUALITY: PROBLEMS AND POLICY,
Caulfield Inst. of Tech. (Australia).
For primary bibliographic entry see Field 5G.
W75-02458

REPORT ON WATER RESOURCES ACTIVITIES IN NEW ZEALAND,
Ministry of Works and Development, Christchurch (New Zealeand). Water and Soil Div.
A. W. Gibson.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 336-347, 3 fig, 3 tab, 5 ref.

Descriptors: Water resources, *Administration, *Water resources development, Planning, Administrative agencies, Water policy, Management, Institutions, Legislation, Precipitation, Water utilization, Organizations, Education, Research and development.
Identifiers: *New Zealand.

Water resources, existing use, projected uses, and organizational arrangements for water resource development were briefly described. The National Water and Soil Conservation Authority sets policy directed toward the most beneficial use of the available water resources. Twenty regional water boards have responsibility for the allocation of the resource and the maintenance of its quality within their regions. They are embarking on comprehensive water resource surveys and are also being encouraged to produce water allocation plans for their regions. With increasing use of the water resource has come an appreciation of the benefits to be derived from planning aimed at ensuring the best multiple uses of the water resource particularly where there are conflicting interests. A regional approach to planning, development, and implementation is being strongly emphasized. The progress made in such areas as legislation, organization, planning, education, research, and development has provided a sound base on which to build the future use, management, and control of water resources. (See also W75-02440) (Humphreys- ISWS)
W75-02459

WATER RESOURCES ACTIVITIES IN NORWAY,
Norwegian Water Resources and Electricity Board, Oslo. Water Resources Div.
A. Hjelm-Hansen, and J. Otnes.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 351-359.

Descriptors: Water resources, *Water resources development, *Europe, Water supply, Surface waters, Legislation, Water utilization, Hydroelectric plants, Administration, Networks, Hydrologic data, Lakes, Rivers, Organizations.
Identifiers: *Norway.

Reviewed briefly were the hydro-electric power developments, water availability, precipitation and surface water station networks, water supply, navigation, floods, salt water encroachment, water quality, finances, plans for the future, research, and legislation and administration activities related to water resources. Satisfying water requirements presents no serious problems. Surface waters provide the supplies for rural, municipal, industrial, and irrigation requirements. Floods seldom cause severe damage or loss of lives. Long-term planning for housing and industrial development is required to include provisions for water supply and discharge of wastewater. A Water Pollution Act, effective January 1, 1970, contains legislation regarding pollution of rivers, sea areas, and groundwater. (See also W75-02440) (Humphreys-ISWS)
W75-02460

WATER RESOURCES IN POLAND--TODAY AND IN THE FUTURE,
Technical Univ. of Warsaw (Poland). Inst. of Environmental Engineering.
Z. Kaczmarek.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 360-370, 1 fig.

Descriptors: Water resources, *Water resources development, *Europe, Hydrology, Management, Education, Water supply, Flood control, Planning, International waters, Water utilization, *Water requirements.
Identifiers: *Poland.

A review of the most important problems concerning hydrology and water resources management in Poland was presented together with the resulting tasks in the field of scientific research and the training of specialists. The main objectives of water resources management in Poland are connected with water supply for the population, industry, and agriculture. Also of great importance is protection against floods which every few years pose a threat to the population and the national wealth in different regions of the country. Problems of hydro-power generation and inland navigation are of lesser importance for the water resources management in Poland. Polish experience in water resources planning pointing out research topics under study was reviewed. The importance of well coordinated international cooperation was stressed. Various aspects concerning education of water resources specialists were discussed. (See also W75-02440) (Scott-ISWS)
W75-02461

RECLAMATION OF WATER RESOURCES IN PORTUGAL,
International Hydrological Decade, Lisbon (Portugal). Portuguese National Committee.
H. A. Ferreira.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973, p 371-383.

Descriptors: Water resources, *Water resources development, *Europe, Organizations, Administration, Administrative agencies, Education, Governments, Water policy, Hydroelectric power, Irrigation, Water supply, River basin development, Planning.
Identifiers: *Portugal.

The primary administrative structures and areas of responsibility related to water problems were listed. A brief summary was given of important water resources developments built or under construction for hydroelectric power, irrigation, and navigation. Potential water resource developments determined from hydrological studies were outlined. Master planning is in progress in order to obtain optimum utilization of the resources for irrigation, water supply, power production, flood control, and shipping. Universities and departments active in the fields of education and research were listed. (See also W75-02440) (Humphreys-ISWS)
W75-02462

SOME RESULTS OF THE ACTION OF WARM WATERS FROM THERMAL STATIONS ON THE EMISSARIES,
For primary bibliographic entry see Field 5C.
W75-02463

WATER RESOURCES, WATER USE AND WATER ADMINISTRATION IN SWEDEN,
International Hydrological Decade, Stockholm (Sweden). Swedish National Committee.
M. Falkenmark.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 410-429, 11 fig, 5 tab, 22 ref.

Descriptors: Water resources, *Water resources development, *Europe, Climatology, Water supply, Lakes, Rivers, *Water utilization, Water demand, Hydroelectric power, Water pollution, Waste water disposal, Land use, *Administration, Legislation, Management, Planning, Research and development, Education, Training.
Identifiers: *Sweden, Baltic Sea.

A brief review was presented of climatic conditions, water availability, actual and future water supply conditions; water power and runoff regulations; use of water resources for waste disposal and the resulting problems of pollution of river and lakes; secondary water pollution due to air pollution; the deterioration of the three largest lakes Malaren, Vanern, and Vattern and of the special pollution problems of the Baltic Sea; hydrological effects of changes in land use; water administration and legislation; supervision, control, and management; the role of water in the physical planning; water research; and education and training in water resources. (See also W75-02440) (Humphreys-ISWS)
W75-02464

ACCELERATION OF POLLUTION AND SALINIZATION PROCESSES BY CONVECTION CURRENTS IN AQUIFERS,
Technion--Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-02465

SOME RECENT WATER RESOURCES ACTIVITIES IN THE UNITED KINGDOM,
Natural Environment Research Council, London (England). Scientific and Technical Services.
A. E. Seddon.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 430-440, 19 ref.

Descriptors: Water resources, *Water resources development, *Europe, Management, Administration, Organizations, Planning, Water supply, Water quality, Water pollution, Investigations, Estuaries, Watersheds(Basins), Floods, Evaporation, Desalination.
Identifiers: *United Kingdom, England, Wales.

A brief outline was given of some aspects of recent United Kingdom water resources activities, primarily in England and Wales. Included were reorganization and management proposals currently the subject of government legislation, water quantity, water quality, pollution, estuary storage, experimental watersheds, flood studies, measurement of precipitation by radar, evaporation from forests, desalination, and algal growth in fresh water lakes. (See also W75-02440) (Humphreys-ISWS)
W75-02466

REVIEW OF WATER RESOURCES IN BRAZIL,
Universidade Federal do Rio Grande do Sul, Porto Alegre (Brazil). Hydraulic Research Inst.
J. L. de Souza.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 443-455, 3 fig, 1 tab.

Descriptors: *Water resources, *Water resources development, *South America, Administration, Organizations, Planning, Hydroelectric power, River basin development, Navigation, Water supply, Irrigation, Hydrology.
Identifiers: *Brazil.

The magnitude of Brazil's land area, water resources, and population were defined in general terms. The annual volume of water discharged by the Amazon River is ten times greater than that of the Mississippi River. Administrative functions related to water resources are performed by six ministries at the federal level. Planning at the state level is conducted by the 21 states and 3 territories. Municipalities are concerned with water supply and sewage facilities. At present there is a trend toward establishment of a Ministry of Water Resources to administer the large number of entities now involved in water resources planning. Each of 11 hydroelectric plants 'on line' or being constructed have capacities greater than 1,000,000 kw. At present, 'Project Hydrology' is underway to inventory the more than 2750 hydrologic stations and organize a computer bank of hydrologic data. (See also W75-02440) (Humphreys-ISWS)
W75-02467

NATIONAL REPORT ON THE STATUS OF CANADIAN WATER RESOURCES ACTIVITIES AND DEVELOPMENT,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
A. T. Prince.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 456-469, 1 fig, 1 tab.

Descriptors: Water resources, *Water resources development, *Water quality, *Canada, Streamflow, Water pollution, Dams, Irrigation, Hydroelectric power, Flood control, Navigation, Seasonal, Regulation, Storage, Water utilization.

Although Canadians have been favoured with an abundance of water resources, the resource is not limitless and care must be taken to ensure that it is properly allocated to growing and changing demands. A brief overview of Canadian water resource activities, how the federal and provincial governments are working together to meet mutual objectives, and specific environmental problems that have been recognized and overcome were outlined. In conclusion, the overall objectives for the future were stated and a number of methods for furthering these objectives were discussed. (See also W75-02440) (Dawes-ISWS)
W75-02468

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN THE UNITED STATES,
Water Resources Council, Washington, D.C.
R. J. Johnson.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973, p 503-510.

Descriptors: *Water resources, *Water resources development, *United States, Planning, Administration, Management, Water resources planning act, Legislation, Administrative agencies, Federal government, Regional development, *US Water Resources Council.

The history of development of water resource demand and management was reviewed. With an annual average precipitation of 30 inches, the country is considered to be 'water abundant,' however, regional excesses and shortages do exist. The Federal Government has been involved in resource maintenance since the 1820's. By 1870, flood control on the Mississippi River became more important and the U.S. Corps of Engineers was made responsible for this activity. At the turn of the century the U.S. Bureau of Reclamation was charged with the responsibility for irrigation in the west. By the 1940's the overlap of many agencies, operating on a function approach, was a matter of concern. Since that time, major efforts have been made to improve the administration and make it more efficient at the federal and state levels. Both levels participate in present-day planning. A Water Resources Council was formed in the 1960's to plan, review, and assist when requested by the states, resources activities. Today there is a growing awareness of the importance of environmental and social aspects of water related projects. Major projects are being delayed until they meet existing criteria. Water is being looked upon as a valuable commodity to be protected and used efficiently instead of being considered a free resource. (See also W75-02440) (Humphreys-ISWS)
W75-02469

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT,
National Pollution Control Commission, Manila (Philippines).
For primary bibliographic entry see Field 6B.
W75-02470

THREE CENTURIES OF SCIENTIFIC HYDROLOGY.
Key Papers of the Celebration of the Tercentenary of Hydrology, Paris, France, September 9-12, 1974. United Nations Educational, Scientific and Cultural Organization, 7 Place de Fontenoy, Paris, France, 1974, 123 p.

Descriptors: *History, *Hydrology, *Conferences, Hydrometry, Hydrologic cycle, Water balance, Measurement, Discharge(Water), Current meters, Instrumentation, Data collections, Data processing, Remote sensing, Hydrologic aspects, Meteorology, Analytical techniques, Water resources development, Water resources, Social aspects, Economics.
Identifiers: Scientific hydrology.

Various aspects of the historical development of hydrology and an outlook for its continuous development in the future were discussed. The subjects were hydrology--a look back and a look forward, hydrology in France in the seventeenth century, general evolution of the concept of the hydrological cycle, historical development of hydrometry, prospects of hydrometry in the light of modern technology, data collection systems and their impact on the future development of hydrology, trends in hydrological analysis, hydrology and water resources development, and the role of

hydrology in economic and social development. (See W75e02472 thru W75-02479) (Humphreys-ISWS)
W75-02471

HYDROLOGY--A LOOK BACK AND A LOOK FORWARD,
United Nations Educational, Scientific and Cultural Organization, Paris (France). Div. of Water Sciences.
S. Dumitrescu, and J. Nemec.
In: Three Centuries of Scientific Hydrology; Key Papers of the Celebration of the Tercentenary of Hydrology, Paris, France, September 9-12, 1974. United Nations Educational, Scientific and Cultural Organization, 7 Place de Fontenoy, Paris, France, 1974, p 16-22.

Descriptors: *Hydrology, *History, *Conferences, Stochastic processes, Hydrologic data, Energy, Water management(Applied), International Hydrological Decade, Hydrologic cycle, Hydrologic aspects, Research and development.
Identifiers: Scientific hydrology.

Reasons for celebrating the Tercentenary of Hydrology were recalled and a number of problems, both theoretical and practical, that may influence the further development of hydrology were identified. The first and major problem was the development of a communication gap between hydrological research and practice. The need to use physical research simultaneously with mathematical models was stressed. Another problem was that of specialized manpower and of the recognition of the profession of 'hydrologist'. Another crucial problem was the unavailability of data; in particular, developing countries found it difficult to develop basic networks. Concern was expressed for the energy crisis and the protection of the environment as well as the imbalance between progress in developing countries and progress in the rest of the world. It was hoped that the celebration of the Tercentenary of Hydrology would inspire thought leading to improved international cooperation in hydrology. (See also W75-02471) (Roberts-ISWS)
W75-02472

HYDROLOGY IN FRANCE IN THE SEVENTEENTH CENTURY, (L'HYDROLOGIE EN FRANCE AU XVIIIE SIECLE),
Societe d'Amenagement du Territoire, Chamalieres (France). Conseiller Technique.
J. Tixeront.
In: Three Centuries of Scientific Hydrology; Key Papers of the Celebration of the Tercentenary of Hydrology, Paris, France, September 9-12, 1974. United Nations Educational, Scientific and Cultural Organization, 7 Place de Fontenoy, Paris, France, p 24-39.

Descriptors: *History, *Hydrology, *Conferences, *Hydrologic cycle, *Water balance, Recharge, Soil physics, *Subsurface flow, Precipitation(Atmospheric).
Identifiers: *France(Seventeenth century).

The development of the hydrological sciences in France in the seventeenth century is discussed. This development can only be understood in the context of general progress of science. Perrault published the first attempt at evaluating the water balance of a basin, but it is particularly as the creator of soil hydrology that he left his name to posterity. Hydrology progressed in the midst of heated discussions. The process of recharge of ground water and of river flow, upheld by Francois, resisted Perrault's attacks. But the discussion had led Perrault to the discovery of the process of subsurface flow, giving equal importance to reserves of soil water and groundwater. The discussion has continued up to the present, as a major portion of current research is oriented to the differentiation between what is attributable to the Francois process and what to the Perrault process. Much more classical is the work of Mariotte. He introduced to hydrology the precision of the physical sciences. His contribution to methods of measurement is remarkable and of interest to the whole of hydrology, particularly the physics of precipitation. (See also W75-02471)
W75-02473

HISTORICAL DEVELOPMENT OF HYDROMETRY,
Bayerische Landesstelle fuer Gewasserkunde, Munich (West Germany).
A. Caesperlein.
In: Three Centuries of Scientific Hydrology; Key Papers of the Celebration of the Tercentenary of Hydrology, Paris, France, September 9-12, 1974. United Nations Educational, Scientific and Cultural Organization, 7 Place de Fontenoy, Paris, France, 1974. p 54-63, 9 ref.

Descriptors: *History, *Hydrometry, Gages, Discharge measurement, Water levels, Discharge(Water), Pitot tubes, Current meters, Floats.
Identifiers: Paddles.

After establishing water level and discharge as main parameters in hydrology, the history of water levels observation was traced through China, India, Mesopotamia, and Egypt. Outlined were the inventions and advances made by Frontinus in ancient Rome, Heron of Alexander, and Leonardo da Vinci, who is credited with making the first float for measuring the velocity of rivers. Other inventors of floats were mentioned before including the work of Pitot and the improved versions of his tube made by Darcy and Bentzel. Since modern discharge measurements were performed mainly with horizontal and vertical-axis current meters, the history of each was traced starting with Hooke in 1663 and ending with Price in 1882. The restricted methods of electric induction and those of salt velocity were mentioned. (See also W75-02471) (Roberts-ISWS)
W75-02474

PROSPECTS OF HYDROMETRY IN THE LIGHT OF MODERN TECHNOLOGY,
Indian Standards Association, New Delhi. Technological Committee No 113.
K. K. Framji.
In: Three Centuries of Scientific Hydrology; Key Papers of the Celebration of the Tercentenary of Hydrology, Paris, France, September 9-12, 1974. United Nations Educational, Scientific and Cultural Organization, 7 Place de Fontenoy, Paris, France, 1974. p 64-78, 45 ref.

Descriptors: *Hydrometry, *Hydrology, *Flow measurement, Stage-discharge relations, Discharge measurement, Flow rates, Instrumentation, Measurement, Structures.
Identifiers: *Scientific hydrology, *Stage measurement, Hydrometric ships, Dilution methods.

New developments were described in hydrometric methods and instruments, such as the gas-purge bubbler technique for measuring water stages, the 'moving boat' method of measuring discharge, and the Hungarian technique for estimating river discharge under ice cover. Several flow measuring instruments were mentioned as well as specially built hydrometric ships, measuring structures such as weirs, and tracers and dye dilution methods for dilution measurements. Methods of measuring suspended sediment load and bed sediment were discussed along with water quality and water temperature measurements. Trends toward improvements in accuracy of measurements were outlined as well as data collection and transmission via satellites. Brief recommendations were given. (See also W75-02471) (Roberts-ISWS)
W75-02475

DATA COLLECTION SYSTEMS AND THEIR IMPACT ON THE FUTURE DEVELOPMENT OF HYDROLOGY,
Department of the Environment, Reading (England). Water Data Unit.
J. Rodda.
In: Three Centuries of Scientific Hydrology; Key Papers of the Celebration of the Tercentenary of Hydrology, Paris, France, September 9-12, 1974. United Nations Educational, Scientific and Cultural Organization, 7 Place de Fontenoy, Paris, France, 1974. p 80-92, 5 fig, 26 ref.

Descriptors: *Hydrology, *Data collections, *Hydrologic aspects, Hydrologic data, Communication, Data processing, Data transmission, Telemetry, Forecasting.
Identifiers: Dissemination, Dee project, Delaware basin.

Comparison was made with past data collection systems in which too much dependence was placed on analysis while ignoring instrumental errors. In 1974 the concept of integrated data collection systems was being accepted. Many examples of such systems came into use in hydrology ranging from automatic weather stations to satellite-based sensors that transmitted images of various types to ground stations for processing and analysis. Examples were described. It was forecast that the gap then existing between the methods of analysis and methods of data collection would be narrowed. Need was indicated for new data such as water equivalent of snow, actual transpiration, and water quality of rivers. Reference was made to the need for data on the amenity and leisure use of water, particularly where decisions have to be made about alternative uses. (See also W75-02471) (Roberts-ISWS)
W75-02476

TRENDS IN HYDROLOGICAL ANALYSIS,
National Weather Service, Silver Spring, Md.
M. A. Kohler.
In: Three Centuries of Scientific Hydrology; Key Papers of the Celebration of the Tercentenary of Hydrology, Paris, France, September 9-12, 1974. United Nations Educational, Scientific and Cultural Organization, 7 Place de Fontenoy, Paris, France, 1974. p 93-101, 11 ref.

Descriptors: *Hydrology, *Hydraulic systems, *Analysis, Electronic equipment, Environment, Environmental control, Energy, Meteorological data, Meteorology, Analytical techniques, Electronic equipment, Computers, Data collections.

Advances in hydrology have been sporadic because the subject has been dispersed among sister sciences for decades, and its development was largely contingent upon the needs of engineers and others to solve practical problems involving hydrology. The electronic computer has provided new approaches to hydrological analysis and has led to the development of conceptual models which treat many of the varied and complex processes affecting the streamflow hydrograph. Growing concern for the environment has brought about a new dimension of hydrology--the study and prediction of water quality. Developments pertaining to data systems have resulted in the automation of real-time networks for water management on a broader scale. Discussed were changing requirements and anticipated trends in hydrological analysis, such as: the role of the electronic computer, concern over preservation of the environment, spiralling food and energy demands, meteorological aspects, trends in data collection systems, and basic research. The design of future water resources projects will be more closely keyed to optimized plans of operations. Forecasts and operation schedules must be derived through an iterative procedure for the highly developed river systems of the future. (See also W75-02471) (Roberts-ISWS)
W75-02477

HYDROLOGY AND WATER RESOURCES DEVELOPMENT,
Rijkswaterstaat, The Hague (Netherlands).
A. Volker.
In: Three Centuries of Scientific Hydrology; Key Papers of the Celebration of the Tercentenary of Hydrology, Paris, France, September 9-12, 1974. United Nations Educational, Scientific and Cultural Organization, 7 Place de Fontenoy, Paris, France, 1974. p 102-109, 4 ref.

Descriptors: *Hydrology, *History, *Water resources development, Hydrologic data, Environmental effects, Data collections, Rational development, Hydrologic aspects, Hydraulics, Hydrologic cycle, Analytical techniques.
Identifiers: Scientific hydrology.

Hydrology was defined as a distinct science because it deals with caprices of nature that introduce elements of uncertainty. The early history of hydrology showed that man did not postpone the control and utilization of water until hydrology and hydraulics provided a solid scientific foundation, and that very important hydraulic systems and structures were built on the basis of experience and empirical rules. Later, in the period between 1850 and World War I, when hydrological data collection started, the design of hydraulic works was based on a minimum of data combined with great engineering skill and a thorough knowledge of the field conditions. Data collection had been considerably expanded, but there were large gaps in the global network. There was no substitute for a lack of data, and modern hydrological methods that provided a more rational and complete interpretation of the data required long records in their application. Since knowledge did not permit a prediction of the effects of large scale intervention, it was necessary to develop models linking the surface, subsurface, ocean, and atmosphere phases of the hydrological cycle. (See also W75-02471) (Roberts-ISWS)
W75-02478

THE ROLE OF HYDROLOGY IN ECONOMIC AND SOCIAL DEVELOPMENT, (ROL GIDROLOGII V EKONOMICHESIKOM. I. SOTSIALNOM RAZVITII),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
A. A. Sokolov.
In: Three Centuries of Scientific Hydrology; Key Papers of the Celebration of the Tercentenary of Hydrology, Paris, France, September 9-12, 1974. United Nations Educational, Scientific and Cultural Organization, 7 Place de Fontenoy, Paris, France, p 110-123.

Descriptors: *History, *Hydrology, *Conferences, Hydrologic cycle, Water balance, Water pollution, *Water supply, *Water utilization, *Water demand, Water quality, Industrial water, Agricultural water, Urbanization.

To meet the various needs of human society, 2,600 cu km are nowadays withdrawn from water courses and reservoirs, which represents about 8% of renewable fresh water resources on earth. The growth of agricultural and industrial output as well as urbanization entail an increasing deterioration of the quality of natural water now to about 300 cu km/year. With such a huge amount of wastes, the idea of using rivers, lakes, and oceans as the last systems must be radically revised. Prevention of pollution and of nonrecoverable water losses, recycling, and other measures of economising water, constitute therefore essential problems of hydrology and water management. The new tasks of hydrology require the establishment of an appropriate inventory of water resources including precise data on the quantity and quality of surface and groundwaters, on their hydrological regime and on their various utilizations. (See also W75-02471)
W75-02479

THE MAIN CHEMICAL AND PHYSICAL CHARACTERISTICS OF THE WATERS OF THE UPPER PARANA AND LOWER PARAGUAY RIVERS, (IN SPANISH),
Instituto Nacional de Limnologia, Santo Tome (Argentina).
For primary bibliographic entry see Field 2K.
W75-02518

WATER USE BY THE KALAHARI LION PANTHERA LEO VERNAYI,
Pretoria Univ. (South Africa). Dept. of Zoology.
F. C. Eloff.
Koedoe. Vol 16. p 149-154. 1973.

Descriptors: *Water consumption, *Lions, South Africa.
Identifiers: Africa, Body, Diet, Fluids, Prey, Vegetable, Water.

The extent to which the Kalahari lion can survive without having to drink water was investigated on the Kalahari Gemsbok National Park (South Africa). It was found that while they may drink regularly where water is available, they may become completely independent of water under extreme desert conditions. Sufficient moisture for their needs seems to be obtained from the blood and body fluids of their prey and the vegetable components of their diet. Loss of water evaporation is reducted by the lion's leisurely way of life.--Copyright 1974, Biological Abstracts, Inc.
W75-02533

USE OF A DEW-POINT HYGROMETER IN EXPERIMENTAL INVESTIGATIONS OF FOREST BIOGEOCENOSES, (IN RUSSIAN),
A. V. Vysotskii, and A. N. Zolotokrylin.
Lesovedenie, 4, p 85-87, 1972, English summary.

Descriptors: *Dew point, *Hygrometry, Forestry.

The block diagram of a dew-point hygrometer is given. The reliability of its operation was checked in a hazel-stone bramble-moss spruce forest. The simultaneous measurement of air temperature and humidity, sufficient accuracy, long-distance operation and reliability permit recommending the dew-point hygrometer as a gradient meter in heat balance investigations in biogeocenoses.--Copyright 1974, Biological Abstracts, Inc.
W75-02604

2B. Precipitation

SIMULATION OF THE HYDROLOGIC CYCLE USING ATMOSPHERIC WATER VAPOR TRANSPORT DATA,
Connecticut Univ., Storrs.
For primary bibliographic entry see Field 2A.
W75-02346

THE MESOSCALE DISTRIBUTION OF RAINFALL IN CALIFORNIA RAINSTORMS,
Naval Postgraduate School, Monterey, Calif.
B. Tappan, III.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-777 873, $4.25 in paper copy, $2.25 in microfiche. Ms Thesis, March 1974. 70 p, 45 fig, 4 ref.

Descriptors: *Rainfall, *Distribution patterns, Storms, Orography, Topography, Mountains, Rain gages, Rainfall disposition, *California, Precipitation(Atmospheric), Winter, Valleys.
Identifiers: *Mesoscale distribution.

The rainfall patterns in California, produced by six storms of the 1972-1973 winter storm season, were analyzed in detail in order to determine the mesoscale distribution of precipitation with respect to the larger-scale synoptic systems. The structure of precipitation patterns primarily reflected orographic influences rather than mesoscale circulation features intrinsic to the larger-scale system. Heaviest amounts of rainfall were concentrated primarily along the major mountain ranges with much lesser amounts in the interior valleys. Storms with fronts produced more precipitation in the inland valleys and more convective type precipitation than storms without well defined fronts. Storms with fronts exhibited geographically fixed bands of precipitation that paralleled the surface front. An elongation of precipitation in the direction of the 500 mb flow was found in one case study. (Jones-ISWS)
W75-02362

A MODEL FOR A CLIMATOLOGY OF THE POTENTIAL OF ICE-PHASE MODIFICATION OF CONVECTIVE CLOUDS,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W75-02363

A NUMERICAL STUDY OF CLEARING WARM FOG BY USING HYGROSCOPIC SEEDING IN CONJUNCTION WITH HELICOPTER DOWNWASH,
Environmental Prediction Research Facility (Navy), Monterey, Calif.
For primary bibliographic entry see Field 3B.
W75-02364

A HISTORY OF AIR WEATHER SERVICE. WEATHER MODIFICATION 1965-1973,
Air Weather Service, Scott/AFB, Ill.
For primary bibliographic entry see Field 3B.
W75-02367

ON THE DESIGN OF WARM FOG CLEARING EXPERIMENTS USING HYDGROSCOPIC TREATMENTS,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W75-02369

MEASUREMENT OF RAINFALL RATES BY LIDAR,
Wisconsin Univ., Madison. Dept. of Meteorology.
S. T. Shipley, E. W. Eloranta, and J. A. Weinman.
Journal of Applied Meteorology, Vol 13, No 7, p 800-807, October 1974. 4 fig, 3 tab, 13 ref. NSF Grant GA-18908.

Descriptors: *Rainfall, *Spatial distribution, Raingages, Wisconsin, Precipitation(Atmospheric), Numerical analysis, Equations, Thunderstorms, Experimental models.
Identifiers: *Monostatic lidar, Madison, Liquid water content, Backscattering, Multiple scattering.

Monostatic lidar was explored as a means for determining the rainfall rate over an extended atmospheric path with a spatial resolution comparable to that of rain gages. An empirical relationship was established between the optical extinction coefficient of rain Beta(r)/km and the rainfall rate R(mm/hr). Correlation of lidar-derived rainfall extinction and gage rainfall rates at Madison gives Beta(r) = 0.16R to the 0.74 power. The Beta(r)-R relations obtained from the work of other authors compared well with this relationship. A lidar equation which accounts for the multiple scattering of light in rain was presented. A numerical procedure that derives estimates of Beta(r) as a function of range from lidar returns was developed. Examples of lidar-derived rainfall rate range profiles in spatially inhomogeneous thunderstorms were given. (Jones-ISWS)
W75-02392

INFLUENCE OF RAINFALL AND ELEVATION ON THE PHYSICO-CHEMICAL PROPERTIES OF SOME COFFEE SOILS OF SOUTH INDIA,
University of Agricultural Sciences, Bangalore (India).
C. C. Biddappa, and B. V. Venkata Roa.
J Indian Soc Soil Sci. Vol 21, No 1, p 47-52. 1973.

Descriptors: *Rainfall, India, Soil chemical properties, Soil physical properties.

Thirty-three surface samples from 12 locations in coffee growing region of South India representing areas of varying elevation (750-1350m) and rainfall (825-3000 mm) were analyzed. A tendency for increase in clay with elevation up to 1020 m was noticed. Similarly silt increased up to 900 m while N content and cation exchange capacity increased with elevation and rainfall. Soluble silica and pH showed a decreasing trend with rainfall.--Copyright 1974, Biological Abstracts, Inc.
W75-02568

2C. Snow, Ice, and Frost

VARIATION OF SNOWPACK DENSITY AND STRUCTURE WITH ENVIRONMENTAL CONDITIONS,
Nevada Univ., Reno. Desert Research Inst.
J. H. Humphrey, and C. M. Skau.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 000, $3.25 in paper copy, $2.25 in microfiche. Completion Report, November 1974. 15 p, 5 fig, 1 tab. OWRR A-038-NEV(1). 14-31-0001-3228.

Descriptors: Snow, *Temperature, *Snowpacks, Density, Flood control, *Micrometeorology, Forecasting, *Snowmelt, *Nevada, Model studies.
Identifiers: Sierra Nevada(Nev), *Snowpack density, Carson Range(Nev).

Knowledge of the response of a snowpack to changes in climatic conditions and other environmental factors is vital to the development of accurate forecasting techniques for flood control and water conservation. Predicting snowpack interior temperatures by a numerical simulation model was the main purpose of this study. Various instruments were used to establish precipitation, water content of snow, density of snow, air, snow and soil temperatures, soil moisture stress, soil water content, wind velocity and direction, vapor pressure and humidity, solar radiation and net radiation. Results showed that snowpack interior temperatures near the surface react quite rapidly to weather factors; surface snow temperature was generally within a few degrees of air temperature. Calculated surface heat fluxes reflected a near balance of net solar radiation and net long wave radiation; influence of storm periods on the snowpack temperatures was dependent on the mean site temperature during and preceding the storm. The model developed was able to predict relative differences of several weeks, with a maximum profile deviation of twenty percent. With the development of this simulation model, data collected from index weather stations can be utilized to compute surface energy balances for prediction of snowpack interior temperatures or surface snowmelt. (Fallon-Nevada)
W75-02350

YELLOWSTONE FIELD RESEARCH EXPEDITION VIII,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W75-02366

2D. Evaporation and Transpiration

A MINIATURE STRIP NET RADIOMETER,
Agricultural Research Service, Watkinsville, Ga.
L. A. Harper.
Agronomy Journal, Vol 64, No 3, p 403-405, May-June, 1972. 4 fig, 9 ref.

Descriptors: *Solar radiation, Energy, Evaporation, Hydrologic cycle, *Instrumentation, *Measurement, *Radiation.
Identifiers: *Radiometers, Net radiation.

An inexpensive miniature strip net radiometer was constructed for average net radiation measurement along a horizontal line in dense foliage such as short grasses or row crops. The sensing surface was 1.3 x 40 cm and was enclosed in a polyethylene shield for protection against wind and weather. The unit was calibrated relative to a temperature-compensated, net-exchange radiometer, and gave a linear response. (Skogerboe-Colorado State)
W75-02395

INCREASE IN CONDUCTIVITY OF IRRIGATION WATER DURING SPRINKLING,
California Univ., Davis. Dept. of Water Science and Engineering.
F. E. Robinson.
Agronomy Journal, Vol 65, No 1, p 130, January-February, 1973. 3 ref.

Descriptors: *Salinity, Sprinkler irrigation, *Evaporation, Irrigation practices, Irrigation engineering, Arid lands, *Conductivity, *California, *Sprinkling.
Identifiers: Imperial Valley(Calif).

The test was conducted in Imperial Valley, California, on a high evaporative demand July day to evaluate the possible harm that could result from concentration of salinity as water is sprinkled in an arid desert area. Catchment breakers (250 ml) were set at 19-m intervals across a 190- x 219-m alfalfa field that was sprinkled for 19.5 hours. Conductivity of the sprinkler water increased 21% on the field edge and 4.4% inside the field. (Skogerboe-Colorado State)
W75-02400

EFFECT OF ANTITRANSPIRANTS ON YIELD OF GRAIN SORGHUM UNDER LIMITED IRRIGATION,
New Mexico State Univ., Clovis. Plains Branch Agricultural Experiment Station.
H. D. Fuehring.
Agronomy Journal, Vol 65, No 3, p 348-351, May-June, 1973. 5 fig, 15 ref.

Descriptors: *Evapotranspiration, *Control, *Grain sorghum, *Crop response, *Antitranspirants, Irrigation, New Mexico, *Stomata.

Reduction of the degree and length of periods of moisture stress through the use of antitranspirants to control stomatal opening may increase the amount of time when photosynthesis takes place thus increasing crop yield with the water available. The proper material, method, and timing of application for field use were determined. Under limited irrigation conditions in the field, grain sorghum was sprayed at various times and rates with phenylmercuric acetate (PMA), atrazine, and Folicote. Mean grain yield increases of 5 to 17% were obtained, indicating considerable economic possibility. Rates of application required were approximately 60 g/ha for PMA, 130 g/ha for atrazine, and 2 liters/ha for Folicote. However, more work is needed on rates and volume of spray. Application just prior to the boot stage was more effective than a later application. (Skogerboe-Colorado State)
W75-02403

RAINOUT SHELTER AND DRAINAGE LYSIMETERS TO QUANTITATIVELY MEASURE DROUGHT STRESS,
Kansas Agricultural Experiment Station, Manhattan. Evapotranspiration Lab.
I. D. Teare, H. Schimmelpfennig, and R. P. Waldren.
Agronomy Journal, Vol 65, No 4, p 544-547, July-August, 1973. 7 fig, 2 ref.

Descriptors: *Lysimeters, *Drainage, Stress, Droughts, *Drought tolerance, Measurement, *Evapotranspiration, Irrigation.
Identifiers: *Rainout shelters.

A modern rainout shelter designed to open and close with an improved electronic control system and to withstand high winds is described. It was installed in conjunction with drainage lysimeters to quantitatively evaluate evapotranspiration, physiological indicators of drought stress, and irrigation scheduling. (Skogerboe-Colorado State)
W75-02418

INTERNAL LEAF WATER STATUS AND TRANSPORT OF WATER IN RICE PLANTS,
Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India). Dept. of Soil Science.
V. S. Tomar, and B. P. Ghildyal.
Agronomy Journal, Vol 65, No 6, p 861-865, November-December, 1973. 8 fig, 26 ref.

Descriptors: *Rice, *Water utilization, *Transpiration, Water transfer, *Leaves, Crop response, Crop production, Soil moisture.

The objective was to relate transpiration rate and leaf water potential to relative water content. This information may be useful in predicting the effect of soil moisture stress on growth and yield. Rice variety 'IR-8' was grown in the greenhouse for 50 to 60 days under submergence and -1/3 bar soil matric potential, and then allowed to wilt. The pressure potential of leaves approached zero at a total water potential of about -19.5 bars, corresponding to 0.33 relative water content. Leaves experienced a change in cell elasticity at about 3 bars pressure potential and -10 bars total water potential. Transpiration rate decreased with leaf water potential, but it was independent of depletion of soil moisture content above 0.21 and 0.18 for plants grown in submerged and unsaturated soil conditions, respectively. These moisture contents correspond to -0.8 bar and -2.0 bars matric potential. (Skogerboe-Colorado State)
W75-02420

AN ECONOMICAL HYDRAULIC WEIGHING EVAPOTRANSPIRATION TANK,
Agricultural Research Service, Morris, Minn.
A. S. Dylla, and L. M. Cox.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 2, p 294-295, 301, March-April, 1973. 5 fig, 2 ref.

Descriptors: *Lysimeters, *Weight, Evapotranspiration, *Instrumentation, *Moisture meters, Moisture content, Soil water, Water loss, *Nevada, Irrigation.
Identifiers: *Evapotranspiration tanks.

Experimental tests were conducted in 1965-66 in Nevada on large soil-filled tanks, 152.5 cm in diameter by 198 cm. deep, supported on 30.5-m lengths of 5-cm diameter butyl irrigation tubing filled with a water-methanol mixture. The tubing was coiled to provide about 90 percent bottom area support. The sensitivity of the weighing system of the low-cost butyl tubing-supported ET tanks is adequate for many evapotranspiration periods. Fabricating the tanks of plain 2.79-mm thick rolled steel with no special reinforcing or structural supporting members minimizes costs. The water-filled butyl irrigation tubing provides a flexible supporting pad that tends to resist imbalanced loads. Routing all hydraulic pressure lines below ground level to a temperature-controlled manometer pit minimizes thermal error and the need for temperature corrections. The cylindrical tank also adapts readily to taking undisturbed

and vegetated soil monoliths. (Skogerboe-Colorado State)
W75-02427

INFLUENCE OF SOIL WATER STATUS AND METEOROLOGICAL CONDITIONS ON EVAPORATION FROM A CORN CANOPY,
Agricultural Research Service, Temple, Texas. Blackland Conservation Research Center.
J. T. Ritchie.
Agronomy Journal, Vol 65, No 6, p 893-897, November-December, 1973. 3 fig, 21 ref.

Descriptors: *Evapotranspiration, *Corn(Field), *Lysimeters, Irrigation design, Water utilization, Crop response, Yield equations, *Soil water, Canopy, Climates, *Evaporation.

Evaporation rates of corn as influenced by soil water status and potential evaporation rate were determined. Actual evaporation rates were measured during the 1972 growing season with a weighing lysimeter. Evaporation rates were practically independent of the soil water status for all existing conditions of potential evaporation. During the season more than 20 cm of soil water was removed from the 120-cm deep profile. Leaf diffusion resistance and leaf water potential measurements indicated that at least 80% of the extractable soil water was freely available to plant roots. (Skogerboe-Colorado State)
W75-02431

UTILITY OF A SIMPLE SOIL WATER BUDGET MODEL IN AGRONOMIC RESEARCH: 3. ESTIMATION OF THE POTENTIAL EVAPOTRANSPIRATION FUNCTION,
Sydney Univ., Narrabri (Australia). North West Wheat Research Inst.
R. G. Fawcett, and O. G. Carter.
Australian Journal of Experimental Agriculture and Animal Husbandry, Vol 14, No 70, p 684-688, October, 1974. 1 fig, 4 tab, 5 ref.

Descriptors: *Moisture availability, *Soil-water-plant relationships, *Wheat, *Estimating equations, *Water balance, Soil moisture, Fallowing, Cereal crops, Evapotranspiration, Evaporation, Transpiration, Correlation analysis, Regression analysis.

Previous work has shown that changes in available water under dryland wheat crops can be estimated from rainfall and evaporation data using a simple model in which changes during the growing season of the potential evapotranspiration (Et) relative to a measure of the potential evaporation from a free water surface (Eo) are expressed by means of the potential evaporation function Et/Eo. The present results illustrate one method by which weekly values of Et/Eo may be objectively estimated in situations where the soil moisture data necessary for the use of iterative methods are not available. The method is based on a multiple regression analysis using an estimated transpiration component (T/Eo) of the potential evaporation function. It is shown that T/Eo has a highly significant correlation with week of sowing, available fallow moisture availability, and yield of tops; the equation of this regression is used in subsequent water balance estimates. The estimates of available soil moisture thus obtained are compared with the results of gravimetric determinations in a field experiment, and it is found that the general trends are similar, though discrepancies of up to 50 mm were recorded. It is concluded that the method should be suitable for plant densities of about 60 plants per sq m, with available fallow moisture of 150 mm or less. (CSIRO)
W75-02480

AN IMPROVED BIO-ASSAY FOR ABSCISIC ACID AND OTHER ANTITRANSPIRANTS,
Lancaster Univ. (England). Dept. of Biological Sciences.
For primary bibliographic entry see Field 2I.
W75-02719

2E. Streamflow and Runoff

A DYNAMIC MODEL OF STAGE-DISCHARGE RELATIONS AFFECTED BY CHANGING DISCHARGE,
National Weather Service, Silver Spring, Md. Office of Hydrology.
For primary bibliographic entry see Field 4A.
W75-02372

ON THE QUESTION OF NON-UNIQUENESS OF INTERNAL HYDRAULIC JUMPS AND DROPS IN A TWO-FLUID SYSTEM,
California Univ., Los Angeles. Dept. of Mechanics and Structures.
For primary bibliographic entry see Field 8B.
W75-02378

THREE CENTURIES OF SCIENTIFIC HYDROLOGY.
For primary bibliographic entry see Field 2A.
W75-02471

HISTORICAL DEVELOPMENT OF HYDROMETRY,
Bayerische Landesstelle fuer Gewasserkunde, Munich (West Germany).
For primary bibliographic entry see Field 2A.
W75-02474

PROSPECTS OF HYDROMETRY IN THE LIGHT OF MODERN TECHNOLOGY,
Indian Standards Association, New Delhi. Technological Committee No 113.
For primary bibliographic entry see Field 2A.
W75-02475

DATA COLLECTION SYSTEMS AND THEIR IMPACT ON THE FUTURE DEVELOPMENT OF HYDROLOGY,
Department of the Environment, Reading (England). Water Data Unit.
For primary bibliographic entry see Field 2A.
W75-02476

INDEX OF FLOOD MAPS PREPARED BY U.S. GEOLOGICAL SURVEY THROUGH 1973,
Geological Survey, Reston, va.
For primary bibliographic entry see Field 7C.
W75-02486

COMPILATION OF STREAMFLOW RECORDS, HELMAND RIVER VALLEY AND ADJACENT AREAS, AFGHANISTAN, 1961-68,
Geological Survey, Tucson, Ariz.
For primary bibliographic entry see Field 7C.
W75-02491

FRESHWATER INPUT TO COASTAL WATERS OFF THE PACIFIC NORTHWEST,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Oceanographic Labs.
R. K. Reed, and W. P. Elliott.
Limnology and Oceanography, Vol 18, No 4, p 683-686, July 1973. 1 fig, 2 tab, 14 ref.

Descriptors: *Estuaries, *Precipitation, *Runoff, *Freshwater, Coasts, Evaporation, Advection, Rainfall, Rivers.
Identifiers: U.S. Northwest Coast.

Recent estimates of precipitation over coastal oceanic waters adjacent to the northwest United States are generally less than half those of previous ones. The newer values of evaporation minus precipitation are inadequate to account for the observed freshwater input to coastal water; advection and river runoff appear to play prominent roles. The new estimates are also considered in an examination of salt and mass fluxes. (NOAA)
W75-02497

INVESTIGATION OF THE ZONAL AND PRODUCTION RELATIONSHIPS IN THE ALLUVIAL DISTRICT OF THE DRAVA RIVER: I. IRRIGATION OF DEAD TRIBUTARIES AND THE ZONAL ARRANGEMENT OF SOIL AND VEGETATION IN THE INUNDATION AREA OF THE DRAVA, (IN GERMAN),
Magyar Tudomanyos Akademia, Vacratot. Botanical Research Inst.
For primary bibliographic entry see Field 2G.
W75-02522

SOUTH ELLENVILLE FLOOD CONTROL PROJECT, RONDOUT CREEK BASIN, NEW YORK; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W75-02571

GAMMARUS FOSSARUM KOCH AS A FALLEN LEAF DECOMPOSER IN FOREST STREAMS: SCHLITZ PRODUCTION BIOLOGICAL STUDIES (5). (IN GERMAN),
Max-Planck-Institut fuer Limnologie, Schlitz (West Germany). Limnologische Flussstation.
J. W. Haeckel, M. P. D. Meijering, and H. Rusetzki.
Freshwater Biol. Vol 3, No 3, p 241-249. 1973. English Summary.

Descriptors: *Leaves, Forests, Decomposing organic water.

In woodland tributaries G. fossarum stays for the most part in accumulations of fallen leaves where it finds food and can hide. On moving upstream it leaves these heaps of leaves and seeks new ones. There is no clear-cut relation between the size of the leaf accumulation and the number of gammarids present; the mobility of Gammarus populations is reflected in this. G. fossarum prefers leaves of Alnus glutinosa to those of order tree species. As alder leaves are softer than other they are preferred as food. The scalding of various leaves removes the preference for certain species. Of the fallen foliage of Fagus sylvatica the thin leaves grown in the shade are attacked 1st and then the thicker ones grown in the light. If there is no choice, G. fossarum will also attack harder leaves, even needles of various pines (Pinus). Needles of Picea abies L. were, on the other hand, rejected completely; large quantities of fir needles in woodland tributaries must therefore influence the trophic structure of them and reduce the Gammarus population. The state of the fallen leaves in Gammarus tributaries can be partly explained in terms of the food preferences of gammarids, but not completely, because the process of breakdown may start on land.--Copyright 1974, Biological Abstracts, Inc.
W75-02659

METHODS OF MEASURING AND COMPUTING FLOOD DISCHARGES,
Geological Survey, Reston, Va.
H. C. Riggs.
In: Flood Investigation; Vol 2 of Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, January 9-12, 1973, Bangkok, Thailand: Asian Institute of Technology, Bangkok, p 13-23, 1973. 5 fig, 12 ref.

Descriptors: *Flood data, *Data collections, *Instrumentation, *Discharge measurement, Flow measurement, Stage-discharge relations, Peak discharge, Flood profiles, Basic data collections, Floods.

River discharge is commonly measured by current meter. The usual procedures must be modified for measuring floods because of high velocities, floating debris, multiple channels, and rapid changes in discharge. Other measuring methods such as the moving-boat method, the use of floats, and rate of filling of a reservoir are suitable at some sites. After the flood has passed, the flood peak can be computed indirectly from a survey of high-water marks and channel characteristics. The various methods are explained and their advantages and weaknesses described. (Knapp-USGS)
W75-02673

A STATISTICAL TREATMENT OF URBAN DRAINAGE DESIGN,
Sheffield Univ. (England).
For primary bibliographic entry see Field 4A.
W75-02680

SLOTTED DRAIN IS DESIGNED FOR SAFETY,
Armco Steel Corp., Middletown, Ohio. Metal Products Div.
For primary bibliographic entry see Field 8A.
W75-02696

SCREENING MODEL FOR STORM WATER CONTROL,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
P. H. Krishen, and D. H. Marks.
Journal of the Environmental Engineering Division, American Society of Civil Engineers Vol 100, No EE4, p 807-820, August, 1974. 1 fig, 2 tab, 8 ref.

Descriptors: *Storm water, *Planning, *Combined sewers, *Sewer systems, Model studies, Simulation models, Overflows, Runoff, Design criteria, Ohio, Storm runoff, Drainage engineering, Drainage systems, Storms.
Identifiers: *Bloody Run Drainage Basin, Storm water control.

A case study was done on the Bloody Run Drainage Basin in Cincinnati, Ohio, to test a new screening model for the planning of control of storm water in combined sewer systems. This simulation model determines the areas of local flooding and appropriate storm design for overflows and runoff. Controls screened are treatment and storage facilities and relief sewers. The screening model is then run to determine if the operating policy is feasible and close to optimal. For the Ohio basin, the best configuration suggested by the screening model and sensitivity analysis results was analyzed in detail on a simulation model. From the information obtained, design details may be implemented. (Prague-FIRL)
W75-02699

THE LIFE CYCLE AND LARVAL GROWTH OF DRUSUS ANNULATUS STEPHENS (TRICHOPTERA, LIMNEPHILIDAE) IN A MOUNTAIN STREAM,
Plymouth Polytechnic (England). Dept. of Environmental Sciences.
A. M. Gower.
J Entomol Ser A Gen Entomol, Vol 47, No 2, p 191-199, 1973, Illus.

Descriptors: *Aquatii uisects, Larvae, Life cycle.
Identifiers: Drusus annulatus, Limnephilidae, Trichoptera.

Monthly collections of D. annulatus in a stream in the Brecon Beacons (S Wales, United Kingdom) show that in this habitat the life cycle differs from that in watercress beds. There is a single generation in the year, with a flight period extending from May to Sept. Adults mate and oviposit soon after emergence, so that by July 1st instar larvae constitute 80% of the aquatic population. Recruitment of 1st instar larvae to the population continues through late summer and autumn, and there is slow water growth. Pupation is 1st recorded in April. Larval growth in the mountain stream, where the water temperature is variable, is slower than in watercress beds, where the spring water remains at 10C.--Copyright 1973, Biological Abstracts, Inc.
W75-02712

2F. Groundwater

ANALOG SIMULATION OF ANISOTROPIC PERMEABILITY,
Louisiana State Univ., Baton Rouge. Dept. of Petroleum Engineering.
R. E. Rinard.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-238 037, $5.25 in paper copy, $2.25 in microfiche. MS Thesis, May 1974. 110 p, 53 fig, 2 tab, 21 ref, 6 append. OWRT A-032-LA(1).

Descriptors: *Analog models, *Simulation analysis, *Permeameters, *Hydraulic conductivity, *Analytical techniques, Model studies, Instrumentation, Equations, Groundwater, Permeability, Mathematical studies, Groundwater movement, Percolation, Anisotropy, Steady flow, Resistance networks.

The hydraulic conductivity of subsurface sedimentary rocks is not equal in all directions. The magnitude of this directional variance in permeability in the plane of bedding was expressed by the two-dimensional anisotropy ratio, A, defined as K sub max/K sub min. The use of a whole core permeameter was investigated to determine the anisotropy ratio and the principal values of permeability of a cylindrical core. An electrical analog device was used to simulate steady-state fluid flow through an anisotropic core fixed in a whole core permeameter. Simulation of anisotropic porous media was achieved by the construction of grid networks of conductive lines drawn on plastic drafting film. Investigated were the effects of anisotropy ratio, permeameter flow window size, and core orientation relative to the major permeability axis, on the pressure drop-flow rate response measured by the permeameter. Interpretive methods were presented for the complete description of the anisotropic properties of a core based upon whole core measurements. (Prickett-ISWS)
W75-02357

FINITE ELEMENT WEIGHTED RESIDUAL SOLUTION OF ONE-DIMENSIONAL, UNSTEADY AND UNSATURATED FLOWS IN POROUS MEDIA,
California Univ., Santa Barbara. Dept. of Mechanical Engineering.
G. Zyvoloski.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-238 029, $4.25 in paper copy, $2.25 in microfiche. MS Thesis, College of Engineering Report, 1973. 66 p, 13 fig, 7 tab, 18 ref, 1 append. OWRT A-039-CAL(3).

Descriptors: *Groundwater, *Soil water, *Mathematical models, *Finite element analysis, *Numerical analysis, Soil water movement, Percolation, Seepage, Infiltration, Pervious soils, Equations, Analytical techniques, Unsteady flow, Moisture availability, Aquifers, Unsaturated flow, One-dimensional flow.
Identifiers: *Galerkin method, *Weighted residual method.

Use was made of the finite element method to describe the unsteady and unsaturated, one-dimensional flow in porous media by employing a weighted residual with a linear shape function and two-dimensional elements in space and time. Results were obtained for both triangular and rectangular elements, as well as several forms of the diffusivity function. These results compared very favorably with the results of other investigators who used different techniques for obtaining solutions. The method was easily programmed, stable, computationally fast, rapidly convergent, and did not require constant parameters over the entire solution domain. (Prickett-ISWS)
W75-02358

THE USE OF RADIOISOTOPES IN TRACING KARST GROUNDWATER IN GREECE, IV,
Democritus Nuclear Research Center, Athens (Greece).
J. Leondiadis, and Ch. Dimitroulas.
Available from the National Technical Information Service, Springfield, Va. 22161, as DEMO 734E, $4.00 in paper copy, $2.25 in microfiche. Report Demo 73/4E, June 1973. 26 p, 6 fig, 5 tab, 11 ref.

Descriptors: *Springs, *Submarine springs, *Sinks, *Tracers, *Karst hydrology, *Groundwater movement, Coasts, Radioisotopes, Aquifers, Flow measurement, Low flow, Current meters, Chelation, Adsorption, Precipitation(Atmospheric).
Identifiers: *Cr51-EDTA, *Greece, Tripolis, Milea and Taka Lake, Argos, Achlacampos, Arkadia, Lakonia, Messinia, Ladon River, Loussios River, Scintillation counter, Carbon active column technique.

Cr51-E.D.T.A. was used as tracer, in two different experiments, for the investigation of any possible interconnection between Milea and Taka Lake sinkholes, on the high plateau of Tripolis, with a number of springs of Argos, Achlacampos, Arkadia, Lakonia, Messinia, Ladon River and Loussios River areas. By these experiments the interconnection between Milea sinkhole and the springs Kiveri (submarine) and Xovrios Achladokampos (31 and 20 km from the sinkhole correspondingly) was proved, as well as between the Taka Lake sinkhole and the submarine spring Big Anavalos. In the case of Milea sinkhole the quantity of the tracer emerged from each spring, the volume of the water existed underground between the sinkhole and the springs and emerged from them, the mean transit time of the water from the sinkhole to each spring, etc. were calculated. (Visocky-ISWS)
W75-02371

HORIZONTAL FLOW IN HYDROTHERMAL SYSTEMS,
New Zealand Geological Survey, Rotorua.
J. Healy, and M. P. Hochstein.
Journal of Hydrology (New Zealand), Vol 12, No 2, p 71-82, 1973. 5 fig, 15 ref.

Descriptors: *Hydrothermal systems, *Thermal water, *Geothermal studies, *Resistivity, Groundwater movement, Permeability, Temperature, Wells, Hydrologic aspects, Model studies, Groundwater.
Identifiers: *Magmatic heat source, Chile, New Zealand.

In some geothermal fields extensive horizontal flows of hot water may occur where hot water is generated in or enters an area through which the local or regional flow of groundwater is largely horizontal. The hot water may interfinger with cold-water flows, but will tend to become sealed off by deposition of silica. The existence of horizontal flow may be deduced by relating systematic resistivity measurements outlining the margins of low-resistivity areas created by the presence of hot saline fluids to inferred geological and hydrological conditions. Recognition of a field of this type is an important factor in siting production wells. (Schicht-ISWS)
W75-02382

ACCELERATION OF POLLUTION AND SALINIZATION PROCESSES BY CONVECTION CURRENTS IN AQUIFERS,
Technion--Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-02465

GEOHYDROLOGY OF THE YUMA AREA, ARIZONA AND CALIFORNIA,
Geological Survey, Reston, Va.
F. H. Olmsted, O. J. Loeltz, and B. Irelan.
Available from Sup Doc, GPO, Washington, D.C. 20403 Price $11.60. Professional Paper 486-H, 1973. 227 p, 58 fig, 17 plate, 21 tab, 102 ref.

Descriptors: *Hydrogeology, *Arizona, *Deserts, Surface-groundwater relationships, Groundwater movement, Return flow, Irrigation water, Data collections, Hydrologic data, Mexico, Colorado River, Water quality, Water chemistry, Model studies, *California.
Identifiers: *Yuma(Ariz).

The Yuma area, Arizona which includes the upstream part of the Colorado River delta within the United States, is one of the driest desert regions of North America. About two-thirds to three-fourths of the total of more than 5 million acre-feet of Colorado River water imported for irrigation from 1922 through 1966 went into groundwater. Drainage wells were installed in order to alleviate drainage problems aggravated by the growth of the groundwater mound. The earth materials of the Yuma area range from dense crystalline rocks to unconsolidated alluvium and windblown sand. Structurally, the Yuma area is characterized by north-northwest-trending mountains separated by broader basins filled with Cenozoic deposits possibly as much as 16,000 feet thick. The upper, principal part of the alluvial groundwater reservoir is subdivided into three zones, two of which cross stratigraphic boundaries. In ascending order, these zones are (1) the wedge zone (lower, major part of the older alluvium), (2) the coarse-gravel zone (uppermost gravel strata of the older alluvium), and (3) the upper, fine-grained zone. Except in two small areas the water contains less than 1,800 mg/liter dissolved solids. Transmissivity of the wedge zone generally increases in a southwestward direction from zero along the thin east and north margins to more than 500,000 gpd per foot where the wedge zone is more than 2,000 feet thick. Transmissivity values for the coarse-gravel zone range from zero to about 1,000,000 gpd per foot. The Colorado River lost water to groundwater until the early 1940's, at which time the channel near Yuma was deepened 5 feet or more by erosion, and groundwater levels rose as a result of irrigation and leakage from the all-American Canal. (Knapp-USGS)
W75-02487

RECONNAISSANCE INVESTIGATION OF GROUND WATER IN THE RIO GRANDE DRAINAGE BASIN--WITH SPECIAL EMPHASIS ON SALINE GROUND-WATER RESOURCES,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-02489

WATER-LEVEL CHANGES IN WEST-CENTRAL KANSAS, 1950-74,
Geological Survey, Garden City, Kans.
For primary bibliographic entry see Field 4B.
W75-02490

WATER WELLS AND SPRINGS IN THE EASTERN PART OF THE UPPER SANTA MARGARITA WATERSHED, RIVERSIDE AND SAN DIEGO COUNTIES, CALIFORNIA,
Geological Survey, Garden Grove, Calif.
For primary bibliographic entry see Field 4B.
W75-02492

GROUND-WATER LEVELS IN WYOMING, 1972-1973,
Geological Survey, Cheyenne, Wyo.
For primary bibliographic entry see Field 7C.
W75-02494

A CONCEPTUAL MODEL OF THE HYDROLOGIC SYSTEM SUPPLYING THE LARGE SPRINGS IN THE OZARKS,
Geological Survey, Rolla, Mo.
G. L. Feder.
Open-file report, December 1973. 148 p, 14 fig, 12 tab, 44 ref, 2 append.

Descriptors: *Hydrogeology, *Karst hydrology, *Missouri, *Springs, *Groundwater movement, Water levels, Water chemistry, Carbonates, Tritium, Tracers, Radioactive dating, Computer programs, Regional analysis, *Model studies.
Identifiers: Ozarks(Mo), *Current River basin(Mo).

The large karst springs in the Missouri Ozarks derive their flow from both a regional aquifer system and local drainage. The regional aquifer system supplies a large proportion of the total springflow. The potentiometric surface of the regional artesian aquifer in the Current River basin shows a systematic trend with the highest values near the headwaters and the lowest values toward the mouth of the Current River. Groundwater from most deep wells in the regional artesian aquifer system is saturated or supersaturated with respect to dolomite. Tritium values indicate that the age of most of the water is pre-1954. In areas of recharge to the regional aquifer system, saturation values with respect to dolomite are often less than 50% and tritium values indicate predominantly post-1954 groundwater. A network of sinkholes, losing streams, and large solution channels rapidly transmits surface drainage underground to the springs. Springflow recession curves combined with carbonate saturation data can be used to semi-quantitatively separate the local drainage to springs from the groundwater contributed by the regional artesian aquifer system. (Knapp-USGS)
W75-02495

SPRINGS OF MISSOURI, (WITH SECTIONS ON FAUNA AND FLORA),
Missouri Geological Survey and Water Resources, Rolla.
J. D. Vineyard, G. L. Feder, W. L. Pflieger, and R. G. Lipscomb.
Water Resources Report No 29, 1974. 267 p, 94 fig, 26 tab, 2 ref.

Descriptors: *Springs, *Missouri, *Karst hydrology, Hydrogeology, Discharge(water), Faults(Geologic), Caves, Fractures(geologic), Karst, Dolomite, Limestones.
Identifiers: *Ozarks(Mo).

Information about springflow in Missouri is presented. The physical and cultural changes in the spring environs are illustrated and described. Most of the significant springs in Missouri and probably all large springs--10 cfs or more--have been measured and sampled. Data on 585 springs are presented, but there are more than 1,100 springs currently on record. The principal spring region of Missouri is the Ozarks province. It is an area characterized by deep, narrow valleys and sharp ridges in the eastern part, the Salem Plateau, and gently rolling landscape in the western part, the Springfield Plateau. Dolomitic rocks are by far the most common in the sequence from which the large springs issue, the soluble character of these rocks made possible the extensive cave and spring systems for which the Ozarks is noted. Of a total of nearly 3,000 known caves in Missouri, more than 2,500 are in the Ozarks. Faulting and fracturing of the carbonate rocks in the Ozarks have had an important effect on the movement of groundwater. The second most important group of springs in the state are in Limestone of Mississippian age. (Knapp-USGS)
W75-02496

VEGETATION DYNAMICS OF THE NATURAL LEVEES AND CHANNELS OF THE ANCIENT AND MODERN DELTA OF THE SYR-DARYA RIVER, (IN RUSSIAN),
For primary bibliographic entry see Field 2I.
W75-02605

2G. Water In Soils

SOIL TEMPERATURE, SOIL MOISTURE AND MAIZE YIELD FROM MULCHED AND UNMULCHED TROPICAL SOILS,
International Inst. of Tropical Agriculture, Ibadan (Nigeria).
For primary bibliographic entry see Field 3F.
W75-02227

DETERMINATION OF THE BREAK-THROUGH VOLUME OF SODIUM CHLORIDE FOR SOIL COLUMNS IN PESTICIDE LEACHING,
Uniroyal, Inc., Naugatuck, Conn. Agricultural Chemicals Research and Development.
For primary bibliographic entry see Field 5B.
W75-02230

SOIL PROFILE CONDITIONS OF CATTLE FEEDLOTS,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 5B.
W75-02244

SEEPAGE OF FEEDYARD RUNOFF WATER IMPOUNDED IN PLAYAS,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 5B.
W75-02314

EFFECT OF IRRIGATION MANAGEMENT ON SOIL-WATER RELATIONSHIPS IN STRATIFIED SOILS,
Nevada Univ., Reno. Desert Research Inst.
G. B. Muckel, and J. C. Guitjens.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-238 055, $3.75 in the paper copy, $2.25 in microfiche. Completion Report, October 1974. 27 p, 3 fig, 39 ref. OWRR A-031-NEV(2). 14-31-0001-3028.

Descriptors: Soil-water-plant relationships, *Storage capacity, *Soil moisture, *Soil water movement, Soil properties, *Irrigation efficiency, Soils, *Hydraulic conductivity.
Identifiers: Quinn River Valley(Nev), Orovada(Nev), Stratified soils.

The purpose is to understand the hydrologic properties of a soil-water system so that irrigation management may be improved. The total volume of water that must be applied in order to fill the soil water storage capacity and the most efficient rate of water application can be determined once the basin soil properties are known. Extensive research was conducted to establish the best means of obtaining water holding capacity, the soil moisture pressure profile and the rate of movement of water through stratified soils in the Quinn River Valley of Nevada. Tests were conducted both in the field and laboratory. Results showed that the laboratory tests were more accurate in determining hydraulic conductivity because (1) field measurements assume that all flow is vertical, (2) non-uniformity exists in the soils tested, and (3) the field instrument used to measure water content takes averages over the area. Results also showed that for these stratified soils field determinations of water holding capacity yield much greater values than estimates based on uniform soil assumption. (Fallon-Nevada)
W75-02351

THE FATE OF FERTILIZER NUTRIENTS AS RELATED TO WATER QUALITY IN THE NORTH CAROLINA COASTAL PLAIN,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-02352

ASPECTS OF SELF-WEIGHT FILTRATION IN CONSOLIDATING SLURRIES,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.
D. E. Smiles.
Soil Sci. Vol 117, No 5, p 288-294, 1974, Illus.
Identifiers: *Filtration, Lagrangian mathematics, *Slurries, Soils, *Water movement, *Soil swelling.

The process of self-weight filtration in saturated systems in terms of theory of water movement in swelling soils is examined. Two aspects of the process are examined experimentally. The Lagrangian mathematics of swelling soils is appropriate to liquid flow in consolidating saturated slurries. Also, the early stages of self-weight filtration of slurries correspond formally to conventional Eulerian mathematics of sorption in non-swelling soils. These are supported by experimental results obtained with bentonite. Results obtained with red mud, produced during extraction of alumina from bauxite, are also consistent with these observations and, in addition, demonstrate that the final equilibrium profiles in slurries are predictable using the definition of the total potential of the water in a saturated swelling soil.--Copyright 1974, Biological Abstracts, Inc.
W75-02355

FINITE ELEMENT WEIGHTED RESIDUAL SOLUTION OF ONE-DIMENSIONAL, UNSTEADY AND UNSATURATED FLOWS IN POROUS MEDIA,
California Univ., Santa Barbara. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2F.
W75-02358

QUANTITATIVE SOIL MOISTURE USE IN CORN GROWN UNDER CONVENTIONAL AND NO-TILLAGE METHODS,
National Weather Service, Lexington, Ky.
For primary bibliographic entry see Field 3F.
W75-02406

WATER TABLE MOVEMENT DURING SUBIRRIGATION,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
R. W. Skaggs.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 5, p 988-993, September-October, 1973. 10 fig, 18 ref.

Descriptors: *Irrigation practices, *Subirrigation, *Water table, Mathematical models, Computer models, Drainage, Irrigation systems, Irrigated design.

The movement of the water table for subirrigation conditions was characterized by numerically solving a nonlinear differential equation describing unsteady flow above a horizontal impermeable layer. Solutions were presented for both initially draining and horizontal water table profiles. Approximate solutions were derived and compared to the numerical results. The effect of water loss by evapotranspiration and deep seepage on the water table rise during subirrigation was also determined by numerical methods. It was concluded that an approximate solution can be used to reliably predict the movement of the water table midway between drains. (Skogerboe-Colorado State)
W75-02413

A TRACTOR-MOUNTED HYDRAULICALLY-OPERATED SOIL SAMPLER FOR RAPID SOIL CORING,
Texas A and M Univ., Lubbock. Agricultural Research and Extension Center.
For primary bibliographic entry see Field 7B.
W75-02414

EFFECT OF POROUS ROOTZONE MATERIALS UNDERLINED WITH PLASTIC ON THE GROWTH OF CREEPING BENTGRASS (AGROSTIS PALUSTRIS HUDS),
Miller, Wihry and Brooks, Louisville, Ky.
For primary bibliographic entry see Field 3F.
W75-02415

CONTROLLING AUTOMATED IRRIGATION WITH SOIL MATRIC POTENTIAL SENSOR,
Agricultural Research Service, Florence, S.C. Coastal Plains Soil and Water Conservation Research Center.
C. J. Phene, G. J. Hoffman, and R. S. Austin.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 4, p 773-776, July-August, 1973. 7 fig, 7 ref.

Descriptors: *Irrigation, *Automatic control, Soil moisture, Moisture meters, Moisture tension, Moisture availability, Crop response, Moisture content, Soil water, *Instrumentation, Measurement.
Identifiers: *Soil matric potential sensors.

The successful use of a soil matric potential sensor to control automatic irrigation has been demonstrated in both the laboratory and the field. The soil matric potential in a soil-plant system was controlled automatically at -0.15 plus or minus 0.01 bar in the laboratory when the system was subjected to variable temperatures. Irrigations were also controlled automatically at -7.6 plus or minus 0.5 bars in a soil-plant system. In the field, the soil matric potential at the 15-cm depth was automatically controlled at -0.21 plus or minus 0.05 bar and -0.27 plus or minus 0.03 bar in plots planted to sweet corn. The fluctuation of the soil matric potential measured could have been further reduced by increasing the duration of water application at each irrigation. This in no way reflects on the capability of the sensor to control the irrigation system. The sensor called for irrigation when water was needed. (Skogerboe-Colorado State)
W75-02417

RAINOUT SHELTER AND DRAINAGE LYSIMETERS TO QUANTITATIVELY MEASURE DROUGHT STRESS,
Kansas Agricultural Experiment Station, Manhattan. Evapotranspiration Lab.
For primary bibliographic entry see Field 2D.
W75-02418

EFFECT OF H2SO4 IN HIGH SODIUM IRRIGATION WATER ON THE GROWTH OF PEAS AND BEANS IN CALCAREOUS SOILS,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
For primary bibliographic entry see Field 3C.
W75-02423

REMOTE SENSING OF FALLOW SOIL MOISTURE BY PHOTOGRAPHY AND INFRARED LINE SCANNER,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering.
W. H. Allen, and J. I. Sewell.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 4, p 700-706, July-August, 1973. 5 fig, 3 tab, 14 ref.

Descriptors: *Remote sensing, *Soil moisture, *Fallowing, *Infrared radiation, Environmental engineering, Soil water, Soil science, Soil physics, *Reflectance.

A laboratory investigation of the relationship between reflectance of bare soil and soil moisture level at wavelengths throughout the visible and into the near infrared was implemented. A definite relationship was found between soil moisture and reflectance. This was adequately described by a quadratic function. Remote sensing appears to be potentially valuable in environmental analysis associated with soil moisture conditions. A need remains for further definition and evaluation of the basic relationship as well as the inclusion of more related variables. (Skogerboe-Colorado State)
W75-02424

SUBSURFACE DRAINAGE AND IRRIGATION FOR SUGARCANE,
Agricultural Research Service, Baton Rouge, La.
For primary bibliographic entry see Field 3F.
W75-02426

INFLUENCE OF SOIL WATER STATUS AND METEOROLOGICAL CONDITIONS ON EVAPORATION FROM A CORN CANOPY,
Agricultural Research Service, Temple, Texas. Blackland Conservation Research Center.
For primary bibliographic entry see Field 2D.
W75-02431

INVESTIGATION OF THE ZONAL AND PRODUCTION RELATIONSHIPS IN THE ALLUVIAL DISTRICT OF THE DRAVA RIVER: I. IRRIGATION OF DEAD TRIBUTARIES AND THE ZONAL ARRANGEMENT OF SOIL AND VEGETATION IN THE INUNDATION AREA OF THE DRAVA, (IN GERMAN),
Magyar Tudomanyos Akademia, Vacratot. Botanical Research Inst.
M. Kovacs, and I. Karpati.
Acta Bot Acad Sci Hung. Vol 18, No 3/4, p 323-353. 1973. Illus. English summary.

Descriptors: *Alluvium, *Succession, Yugoslavia, Soil chemical properties, Soil physical properties, Drava River.
Identifiers: Alluvial, Arrangement, Dead, Drava, Hungary, Inundation, Irrigation, Production, Relationships, River, Soil, Swamp, Tributaries, Vegetation, Wood, Zonal, Zones.

The alluvial process in the inundation basis of the river Drava (Hungary), and the various zones of soil and flora are examined. In the alluvia and in their zones, 3 soil types (inundation meadow soil, marshy meadow soil and moorland) come into existence, according to water and moisture conditions. The zonal arrangement of vegetation occurs in accordance with the soil and water conditions. Concerning the outer zone of the alluvia, the organogenous succession series, closing with swamp wood, is characteristic. The soils of the various vegetation zones are significantly different in several physical and chemical factors. Inferences made in the paper are primarily relevant to the areas alluviated from the deposit of the river Drava.--Copyright 1974, Biological Abstracts, Inc.
W75-02522

PLANT DISTRIBUTION ON A SASKATCHEWAN PRAIRIE,
University of the South Pacific, Suva (Fiji). School of Natural Resources.
G. B. K. Baines.
Vegetatio. Vol 28, No 1/2, p 99-123. 1973. Illus.

Descriptors: *Grasslands, Plant groupings, Saskatchewan.

An intensive study of plant species distributions on a Saskatchewan (Canada) prairie is reported here. Frequency data for 59 vascular species and varieties are presented in association with environmental data relating to soil moisture, water retaining capacity, soil pH and slope position. Seconda-

ry consideration is given to light, which is important in the distribution of the understory in dense shrub stands, and soil texture. Soil moisture is shown to be the main determinant of plant species distribution.--Copyright 1974, Biological Abstracts, Inc.
W75-02523

HYDRODYNAMIC DISPERSION IN UNSATURATED POROUS MEDIA: I. CONCENTRATION DISTRIBUTION DURING DISPERSION,
Jawaharlal Nehru Agricultural Univ., Jabalpur (India).
For primary bibliographic entry see Field 2K.
W75-02529

STUDIES ON SOUTHERN PENNINE PEATS: V. DIRECT OBSERVATIONS ON PEAT EROSION AND PEAT HYDROLOGY AT FEATHERBED MOSS, DERBYSHIRE,
Manchester Univ. (England). Dept. of Botany.
J. H. Tallis.
J Ecol. Vol 61, No 1, p 1-22. 1973. Illus.

Descriptors: *Peat, England, Erosion, Gullies.
Identifiers: Burning, Derbyshire, Direct, Frost, Moor, Moss, Run-off, Southern, Vegetation.

The topography, present-day vegetation, distribution of peat, and pattern of erosion on Featherbed Moss, Derbyshire, England, is described. Qualitative and quantitative observations on peat erosion in a single gully over a 12-mo. period are presented as records of precipitation, incidence of frost and snow, water-table levels in the peat, rates of stream flow in the gully, and dry weight of peat caught in a simple peat trap monitoring part of the total stream flow. Substantial peat erosion is shown to occur during snow-melt and during heavy rain, when stream flow rates exceed 40-50 l/min. The role of frost and drought in loosening the surface layers of bare peat exposed in the gullies is discussed. A crude method of determining the total annual peat erosion in the study gully from the partial catches recorded in the peat trap is described, and an annual figure of 200-300 kg dry weight peat suggested as a realistic estimate of the present-day rate of erosion. On gently sloping ground appreciable lateral movements of water through the uppermost 30 cm of peat are shown to occur, though the rate is insufficient to maintain a permanent water flow in the gully during periods of drought. Overland flow probably occurs, however, during rainfall of intensities greater than 0.75 cm/24 h, and on sloping ground it is estimated that up to 20% of the total precipitation may flow into the guillies as surface run-off. Moor-burning is tentatively suggested as the cause of the peat erosion occurring on Featherbed Moss; this is supported by the direct estimate of the rate of peat erosion, which gives a minimum duration for the erosion of 200-250 yr.--Copyright 1974, Biological Abstracts, Inc.
W75-02531

THE EFFECTS OF PHOSPHORUS DEFICIENCY ON WATER CONTENT AND RESPONSE TO DROUGHT,
East Malling Research Station, Maidstone (England).
D. Atkinson, and A. W. Davison.
New Phytol. Vol 72, No 2, p 307-313. 1973.

Descriptors: *Phosphorus, Drought, *Moisture stress.
Identifiers: Arctium minus, Centaurea nigra, Plantago lanceolata, Rumex.

Acute P deficinecy was induced in seedlings of a number of species (Arctium minus, Centaurea nigra, Plantago lanceolata, Rumex acetosa, R. crispus, R. obtusifolius and R. sanguineus) over a period of 5 wk. Deficiency affected dry weight, root/shoot ratio, leaf water content, leaf water deficits and the time taken for the plants to show visible stress after watering was stopped. Populations of 2 of the species from soils differing in P status showed consistent and major differences in the effects of P deficiency. The ecological implications of the results are discussed.--Copyright 1973, Biological Abstracts, Inc.
W75-02537

EFFECT OF SOIL MOISTURE AFTER YOUNG PANICLE FORMATION STAGE ON PROTEIN, FAT AND ASH CONTENTS IN LOWLAND BROWN RICE, (IN JAPANESE),
National Food Research Inst., Tokyo (Japan).
H. Taira, H. Taira, and S. Inoue.
Proc Crop Sci Soc Jap. Vol 42, No 4, p 422-427. 1973.

Descriptors: *Soil moisture, *Rice, Japan.

Investigations were carried out to determine the influence of soil moisture, i.e., pF: 0, 1.5, 2.2 and 2.7, after young panicle formation stage on the protein, fat and ash contents in lowland brown rice of 2 cultivars, 'Tone-wase' and 'Norin 22.' All the components were influenced by the soil moisture conditions. As the soil moisture decreased, the protein content increased and the ash content decreased. The fat content increased slightly after decreasing from pF 0 to 1.5. Ash and protein content were most influenced.--Copyright 1974, Biological Abstracts, Inc.
W75-02539

PEDOBIOLOGICAL CHARACTERISTICS OF SOME SOILS IN THE LITHUANIAN SSR. 4 WATER AND AIR REGIME IN SODDY PODZOLIC SOIL UNDER OATS. (IN RUSSIAN),
V. V. Milyauskas.
Liet Tsr Moksiu Akad Darb Ser B. 1. p 43-53, Illus, 1973. English summary.

Descriptors: *Leaching, *Soil moisture, Carbon dioxide, *Podzols, Oats.

During the period of 1966-1968, (USSR) soil in the wet season had a leaching moisture regime and in the dry period lacked moisture. The soil hydrothermic regime and vegetation determined the aeration condition, CO2 in soil air and its release into the atmosphere.--Copyright 1974, Biological Abstracts, Inc.
W75-02542

SOME PHYSICAL PROPERTIES OF FRACTIONS OF MECHANICAL ELEMENTS OF YELLOW SOILS IN THE HUMID SUBTROPICAL ZONE, (IN RUSSIAN),
Moscow Univ. (USSR).
S. E. Karaseva.
Vestn Mosk Univ Ser 6 Biol Pochvoved, Vol 28, No 6, p 101-105.

Descriptors: *Soil moisture, *Capillary water, Humus, Hygroscopic water.

When the degree of dispersion of particles increases, the specific gravity of humus, the bulk density, and the rate of the capillary rise of water decrease, with the specific gravity in the lower horizons, the maximum hygroscopic moisture, the total water holding capacity increasing. The particles less than 0.005 mm in diameter are plastic, can swell and coagulate in diluted solutions of CaCl2.--Copyright 1974, Biological Abstracts, Inc.
W75-02543

LYSIMETER INVESTIGATIONS ON NITROGEN LEACHING ON MANURING WITH STRAW AND APPLICATION OF VARIOUS FORMS OF N, (IN GERMAN),
Badische Anilin- und Soda-Fabrik A.G., Ludwigshafen am Rhein (West Germany). Landwirtschaftliche Versuchsstation.
J. Jung, and J. Dressel.
Z Acker- Pflanzenbau, Vol 136, No 4, p 280-289, Illus, 1972. English summary.

Descriptors: *Lysimeters, *Nitrogen compounds, Fertilizers, Rotations, Potatoes, Rye.

In a 10-yr lysimeter experiment, the influence of straw manuring on the uptake and leaching of N on 3 different forms of N (calcium-ammonium nitrate, urea and calcium cyanamide) with 2 times of application (autumn and spring) was studied. The crop rotation consisted of an annual alternation of late potatoes and rye. Fertilization for autumn N-balance restoration on sandy soil under the climatic conditions of the Rhine plain near Ludwigshafen, Germany, led to a higher degree of N leaching than a comparable manuring system with and without straw in the spring. N uptake by the plant was reduced with autumn fertilization. With application in spring, straw manuring reduced N uptake. Less N was taken up from urea and calcium cyanamide in the variants without straw than from calcium-ammonium nitrate, while leaching was roughly the same. In the plots manured with straw, only slight differences were found between the different N forms at both times of application. As regards yield, potatoes which were planted immediately after the application of the straw showed slight reductions in yield when manuring was carried out in spring, whereas with autumn application the yields were considerably reduced. Rye on the other hand increased yields in the straw variants, especially with autumn application of N. This may be regarded as an after-effect of the N balance manuring to the straw. With regard to N uptake and N leaching and also the effect on yield of the N combined with straw, the decisive factor, under the given conditions of soil and climate, was not so much the N form as the time at which it was applied.--Copyright 1974, Biological Abstracts, Inc.
W75-02544

WATER-SALT REGIME OF SOILS IN THE CASE OF LIMAN IRRIGATION IN THE COASTAL BELT OF THE GURYEV OBLAST, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Pochvovedeniya.
V. Kh. Pak, V. M. Starodubtsev, A. G. Usachev, and S. S. Sokolov.
Izv Akad Nauk Kaz SSR Ser Biol. 5. p 30-36, 1973.

Descriptors: *Saline soils, USSR, *Marshes, Grasslands, Irrigation.

The reclamation conditions of the Caspian coastal liman (Marsh) in the Gur'ev district of Kazakh SSR (USSR), are described, including the character, degree and chemistry of salinization of soils. The characteristics of the water-salt regime of soils in the case of liman irrigation were investigated on 9 plots in 1969-1972. It was established that the creation of high-productivity limans as haylands by using the effluents of industrial plants of Gur'ev is exceptionally complicated by the strong degree of salinization of the soils and groundwaters with a predominance of chlorides and by the absence of a natural drainage systems. Progressive salinization occurs in liman meadow solonchak soils over the course of years. Partial freshening of the soils as a result of irrigation is succeeded by intense restoration of salinization in the same or next year.--Copyright 1974, Biological Abstracts, Inc.
W75-02549

FORECASTING THE YIELD POTENTIAL OF PASTURES OF SOUTHWESTERN KYZYL KUM, (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Botaniki.
A. D. Li, and Kh. V. Khamzin.
Uzb Biol Zh, Vol 17, No 6, p 34-36, 1973.

Descriptors: *Pastures, *Soil moisture, USSR.

Identifiers: Artemisia diffusa, Artemisia turanica, Nanophyton erinaceum, Salsola-arbuscula, Salsola-orentalis, Kyzyl-kum.

The water regime and dynamics of productivity were studied in the main plant associations (Artemisia diffusa + A. turanica-Ephemeretum, A. turanica + Salsola orientalis-S. arbuscula and Nanophyton erinaceum) of southwestern Kyzyl-Kum ('Red Sand Desert') (Ussr). Good conditions for accumulating a harvest occur in March. Precipitation falling in April and May is quickly evaporated. The cropping power of the pastures can be forecast on by the depth of soaking and amount of the moisture reserve in the upper half-meter layer of soil in the 3rd decade of March.--Copyright 1974, Biological Abstracts, Inc.
W75-02550

TRANSACTIONAL DYNAMICS OF POULTRY MANURE IN SOIL,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 5C.
W75-02575

INFLUENCE OF SOIL WATER CONDITIONS ON GROWTH AND ROOT POROSITY OF RICE,
Indian Inst. of Tech., Kharagpur. Dept. of Agricultural Engineering.
S. K. Pradhan, S. B. Varade, and S. Kar.
Plant Soil, Vol 38, No 3, p 501-507, 1973, Illus.

Descriptors: *Rice, Roots, *Moisture tension, Soil water.

The influence of different depths of submergence (6 plus or minus 1 and 3 plus or minus 1 cm) and moisture tensions (0, 20, 60, 350, 500 and 1000 millibar) of lateritic sandy loam soil on root porosity and growth parameters of rice, cultivar IR8 was studied at 2 different growth phases under controlled greenhouse conditions. Best rice growth occurred at 3 plus or minus 1 cm submergence and it significantly reduced with the increase of soil moisture tension. Unlike other growth parameters, root length increased as the soil moisture tension was raised. The development of pore spaces in rice roots decreased significantly with the increase in soil moisture tension. However, higher root porosity was observed under greater depths of submergence. Irrespective of soil water condition, the number and dry weight of the root system showed significant positive correlation with root porosity. O2 diffusion rate in soil, which increased with the increasing moisture tension, was significantly and inversely related with the porosity of rice root.--Copyright 1974, Biological Abstracts, Inc.
W75-02662

2H. Lakes

ONE-DIMENSIONAL DIFFUSION EQUATIONS FOR THE VERTICAL TRANSPORT IN AN OSCILLATING STRATIFIED LAKE OF VARYING CROSS-SECTION,
Weizmann Inst. of Science, Rehovoth (Israel). Dept. of Isotope Research.
Y. Tzur.
Tellus, Vol 25, No 3, p 266-271, 1973. 1 fig, 4 ref.

Descriptors: *Equations, *Stratification, *Diffusion, Lakes, Depth, Sinks, Bottom sediments, Temperature, Thermocline, Gradation, Mathematical models.
Identifiers: *Vertical transport, Oscillating stratified lakes, Isopycnals, Horizontal divergence.

The importance of the diffusion equations for the understanding of the distribution and transport of heat and matter in lakes is pointed out. Lateral uniformity of stratified lakes permits the description of vertical diffusion by a one-dimensional equation, with full regard to their three-dimensional nature. Such an equation should not be obtained simply by neglecting the horizontal divergence, because then significant terms are discarded. The complete equation is obtained by integration of the full three-dimensional equation over the volume under isopycnals. Two functions appear in it that do not appear in the simple equation (without horizontal divergence): the horizontal cross-section of the lake, and the surface sources. These correspond to two effects: the variation of the horizontal cross-section of the lake with depth and the existence of sources or sinks on the lake bottom at different depths. The same equation can be applied to oscillating lakes, by describing temperatures and concentrations as functions of a new independent variable, the volume under isopycnals. The diffusivities and sources in the equation must then be interpreted as weighted averages, unfluenced by the correlation between the quantities appearing in them. (Jones-Wisconsin)
W75-02256

A STUDY OF THE CLAM, RANGIA CUNEATA, IN LAKE PONTCHARTRAIN AND LAKE MAUREPAS, LOUISIANA,
Louisiana Wild Life and Fisheries Commission, New Orleans.
For primary bibliographic entry see Field 8I.
W75-02264

DIATOM SUCCESSION AND INTERACTION IN LITTORAL PERIPHYTON AND PLANKTON,
Victoria Univ. (British Columbia). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-02268

ECOLOGICAL STUDY COMPARING THE POPULATIONS OF OSTRACODA IN TWO FISH-BREEDING PONDS IN UPPER BELGIUM, (IN FRENCH),
Institut Royal des Sciences Naturelles de Belgique, Brussels.
D. Pierre.
Hydrobiologia, Vol 43, No 3/4, p 273-284, 1973, Illus. English summary.
Identifiers: *Belgium, *Ecological studies, Fertilization, Fish ponds, *Ostracoda, Seasonal, Diversity indices, *Crustaceans, *Distribution patterns.

The populations of ostracods inhabiting 2 ponds were studied. One of the ponds was left in its natural state and is of an oligotrophic type; the other one was fertilized once a year, mainly with lime and calcium phosphate. The water feeding the last one is neutralized by a regular addition of calcium carbonate. Comparison of the densities of ostracods shows that this fertilization has a positive action on the abundance of these crustaceans. Spatial distribution of the ostracods is of the aggregative type. Specific composition is similar in both ponds but for some scarce species. Specific diversity suggests a higher organization level in communities inhabiting the 'natural' pond. The diversity index H of Shannon-Weaver shows a rather parallel seasonal fluctuation in both biotopes.--Copyright 1974, Biological Abstracts, Inc.
W75-02272

PLANKTON OF FRESH AND BRACKISH WATERS IN THE SODERTALJE AREA,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
M-B. Florin.
Acta Phytogeographica Suecica, Vol 37. 144 p, 35 fig, 35 tab, 20 plates, 206 ref.

Descriptors: *Plankton, *Freshwater, *Brackish water, Lakes, Glaciation, Fjords, Phytoplankton, Diatoms, Zooplankton, Salinity, Geologic history, Chemical properties, Physical properties, Varieties, Aquatic plants, Vegetation, Distribution, Systematics.
Identifiers: *Sodertalje(Sweden), Lake Malaren(Sweden), Baltic fjords, Desmids.

This limnological investigation was carried out in the eastern part of the Province of Sodermanland in the watershed between Lake Malaren and the Baltic, called the 'Sodertalje area.' A rift valley, the northern part is occupied by inlets of Lake Malaren and the southern part by a Baltic inlet which divides the Sodertalje. The lakes are grouped into inland lakes, lowland lakes, and the Malaren-Baltic fjords. Physical, chemical, and biological analyses were made. In lowland lakes the characteristic plankters of the Chlorococcaleta, Diatometa, and Myxophyceta occur, but the associations are mixed. The most vigorous development of Diatometa are in the Malar-Baltic fjords; there diatoms constitute the most important phytoplankton group. Fragilaria crotonensis occurs in tremendous quantities, and Melosira granulata is abundant. All diatoms recorded from the Baltic inlets occurred in waters with an average salinity less than half of the lower boundary value, 5. Most brackish-water diatoms in the Baltic locations were of a euryhaline character. As desmids usually flourish in oligotrophic waters, it seemed noticeable that so many species grew in the brackish and polluted waters south of Sodertalje city. Phytoplankton and zooplankton distribution is tabulated. (Jones-Wisconsin)
W75-02276

POLLEN PROFILES OF LATE PLEISTOCENE AND RECENT SEDIMENTS FROM WEBER LAKE, NORTHEASTERN MINNESOTA,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 2J.
W75-02278

A PLANKTON SAMPLE FROM LAKE VICTORIA,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
K. Thomasson.
Svensk Botanisk Tidskrift, Vol 49, No 1-2, p 259-274, 1955. 44 fig, 34 ref.

Descriptors: *Africa, *Plankton, Diatoms, Zooplankton, Rotifers, Benthos, Shallow water, Varieties, Systematics.
Identifiers: *Lake Victoria(Africa), Desmids, Tychoplankters.

Lake Victoria-Nyanza belongs to the oldest group of lakes in the world and its great age is expressed in its flora and fauna. A random sample contained many forms of taxonomic interest, and particularly among the diatoms and chlorococcales, certain species exhibit a wide amplitude of variation. The phytoplankton is dominated by chlorococcales, desmids, and diatoms; among zooplankton, rotifers are abundant. A systematic account of the plankters is given. The sample contained, in addition to euplankters a considerable amount of tychoplankters and benthos probably due to the nature of the bays near the collection site which contain shallow water and are partly bordered by swamps. The list contains a number of plankters not heretofore noted from Victoria-Nyanza but still missing are some genera which are dominant features in European lake-plankton. Most noticeable in this respect are Dinobryon and Asterionella, observed earlier by Woloszynska, but not found since. The absence of Tabellaria, Coelosphaerium and Gloeococcus pointed out by West and of the genus Fragilaria pointed out by Bachmann is probably due to their rarity. The phytoplankton of Lake Victoria as well as of the other great African lakes is best characterized by gorgeous species of Cymatopleura, Melosira, and Surirella. (Jones-Wisconsin)
W75-02280

PLANKTOLOGICAL NOTES FROM WESTERN NORTH AMERICA,
Uppsala Univ., (Sweden). Inst. of Plant Ecology.
K. Thomasson.
Arkiv for Botanik, Series 2, Vol 4, No 14, p 437-463, 1962. 50 fig, 67 ref.

Descriptors: *Phytoplankton, *North America, *Lakes, California, Nevada, Oregon, Wyoming, Montana, Canada, Geographical regions, Systematics, United States, Varieties.
Identifiers: *Western North America, Lake Tahoe(Calif-Nev), Crater Lake(Ore), Lake Breitenbush(Ore), Grand Teton Lakes(Wyo), Yellowstone Lake(Wyo), Two Medicine Lake(Mont), Waterton Lake(Alberta), Banff National Park lakes, Jasper National Park lakes, Tabellaria teilingii, Ducellieria chodatii, Desmids.

Ranging form Lake Tahoe to lakes in the Jasper National Park, accessible by public transportation, were visited and phytoplankton recorded. These included Lake Tahoe, Crater Lake, Lake Brietenbush in the Mt. Hood National Forest, Grand Teton Lakes, Yellowstone Lake, Two Medicine Lake, Watertown Lake, lakes in Banff National Park, and in the Jasper National Park. The occurrence of Tabellaria teilingii in the Grand Teton National Park lakes is mentioned. The abundant occurrence of Ducellieria chodatii in the plankton of some shallow lakes in the Canadian Rockies is also noteworthy. Among the desmids there are some plants which are interesting from a phytogeographical as well as a taxonomical point of view. The phytoplankton of western North American lakes which were visited seems to be definitely boreal. There are few endemic boreo-American phytoplankters to be found, e.g., Stephanodiscus niagarae, Peridinium volzii f. vancouvererense, and Staurastrum natator v. rhomboideum. Only Lake Tahoe seems to differ entirely from a phytogeographical perspective; it has a plankton community related to the lake communities in the eastern United States. The eastern United States have a very rich algal flora, particularly desmids, due to the presence of a phytogeographical element characterized as neotropical. (Jones-Wisconsin)
W75-02282

REFLECTIONS ON ARCTIC AND ALPINE LAKES,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
K. Thomasson.
Oikos, Vol 7, No 1, p 117-143, 1956. 13 fig, 40 ref.

Descriptors: *Arctic, *Alpine, *Lakes, Climates, Water temperature, Solar radiation, Ultraviolet radiation, Nutrients, Phytoplankton, Zooplankton, Distribution.
Identifiers: Hydroclimate.

Conditions in arctic and alpine aquatic habitats have much in common. The similar environment and the historical development of these lakes resulted in a number of organisms which are either common to both habitats or occupy each other's places. Of particular importance are the conditions of temperature depending on distribution of radiant energy upon the surface of the earth. Arctic habitats are characterized by a small supply of heat and by a short vegetational period in comparison with lower latitudes. Alpine habitats also differ in these respects from lower levels. In arctic and often also in tropical lakes the biologically very important thermocline is feebly developed in comparison with temperate lakes which facilitates the transport of heat into the deeper water. Ultraviolet radiation influences the vertical distribution of plankton, since zooplankters especially avoid excessive ultraviolet radiation. The small amount of nutritive materials often constitues a limiting factor. The phytoplankton preserves its cosmopolitan character; the cosmopolitan element is also striking among the zooplankters of arctic and alpine lakes. Phytoplankton and zooplankton are listed. The majority of arctic and alpine lakes can be characterized as extremely oligotrophic or ultra-oligotrophic, and also as feebly productive. (Jones-Wisconsin)
W75-02285

GLUCOSE-14 UPTAKE IN LAKE HIIDENVESI,
Helsinki City Waterworks (Finland).
For primary bibliographic entry see Field 5C.
W75-02296

QUANTITATIVE RELATIONSHIPS OF THE ROTATORIA PLANKTON IN LAKE BALATON DURING 1965-1966,
Magyar Tudomanyos Akademia, Tihany. Biological Research Inst.
Nora P-Zankai, and Jeno E. Ponyi.
Ann Inst. Biol (Tihany) Hung Acad Sci. 39. p 189-204, 1972, Illus.
Identifiers: *Hungary(Lake Balaton), Lakes, *Plankton, Population dynamics(Plants), *Rotatoria.

In Lake Balaton (Hungary) the same 5 spp. dominated during the periods of examination. The number of accompanying species, however, varied; in 1965 and 1966 it was 7 and 21, respectively. Monthly averages of total numbers/l of Rotatoria show that the population density was the highest in the central areas of the lake (110-195 individuals/l), while in the Bay of Keszthely and in the other end of the lake numbers smaller by 9-30% and 6-22%, respectively, were registered. In 1965 an increase in the total population took place twice in the whole lake except in the Bay of Keszthely, and the increases along transversal sections 'G-E' were smaller in summer than in autumn. In 1966, total numbers/l of rotifers increased twice and 3 times in the SW and NE basins, respectively. In the whole lake the increase in population was greater in summer than in autumn. The population dynamism of the dominating species along the individual transversal sections was not the same in the 2 yr examined. The maximum population density of some species was smaller in 1965 than in the following year. Identical periods of the 3 yr show that whereas the population density in 1966 was the highest, only small quantitative differences existed between the other 2 yrs.--Copyright 1974, Biological Abstracts, Inc.
W75-02309

THE BIOMASS OF ROTATORIA IN LAKE BALATON,
Magyar Tudomanyos Akademia, Tihany. Biological Research Inst.
N. P.-Zankai, and J. E. Ponyi.
Ann Inst Biol (Tihany) Hung Acad Sci. 40. p 285-292, 1973.
Identifiers: *Biomass, *Hungary(Lake Balaton), Keratella-quadrata, Lakes, Polyarthra-vulgaris, Pompholyx-sulcata, *Rotatoria.

Among the most frequent rotifers of the lake 3 species (Polyarthra vulgaris, Keratella quadrata and Pompholyx sulcata) represent the highest biomass values. On the basis of average biomasses of years 1965, 1966 and 1967, Polyarthra vulgaris is of the highest importance showing a value of 8.3 and 14.1 mg/cu m in the Keszthely Bay (Lake Balaton, Hungary) and its surrounding as well as in the other parts of the lake. Keratella quadrata, and Pompholyx sulcata display different distribution of biomass in the 2 areas; the former, 7.9 mg/cu m in the samples taken from the Keszthely Bay and its surroundings, the latter 0.4 mg/cu m. In segments representing about 2/3 of the lake, the former showed a biomass value of 3.5 mg/cu m and the latter 10.3 mg/cu m. In the larger part of the open water, the total biomass of the Rotatoria gradually increased till the 1950s from 6.5 to 40.9 mg/cu m, then it remained at nearly the same level until 1967 (38.7 mg/cu m).--Copyright 1974, Biological Abstracts, Inc.
W75-02356

PRESENT AND HISTORIC GEOCHEMICAL RELATIONSHIPS IN FOUR MAINE LAKES,
Maine Univ., Orono. Dept. of Geological Sciences.
For primary bibliographic entry see Field 5C.
W75-02359

SEASONAL CHANGES IN NUMBERS OF SOME PHYSIOLOGICAL GROUPS OF MICROORGANISMS IN ILAWA LAKES,
Wyzsza Szkola Rolnicza, Olsztyn-Kortowo (Poland). Katedra Mikrobiologii Technicznej.
For primary bibliographic entry see Field 5C.
W75-02373

PHYTOPLANKTON IN TWO PONDS IN KATHMANDU VALLEY (NEPAL),
Max-Planck-Institut fuer Limnologie zu Ploen (West Germany).
B. Hickel.
Int Rev Gesamten Hydrobiol, Vol 58, No 6, p 835-842, 1973.
Identifiers: *Ceratium-hirundinella, *Nepal(Kathmandu Valley), *Phytoplankton, Ponds, Seasonal, Valleys, Water analysis, Chemical properties, Water temperature, Conductivity, Alkalinity, Hydrogen ion concentration.

Qualitative and quantitative analyses of the plankton were made. Vertical and seasonal variations of the plankton of 1 pond were studied as well as physical and chemical properties of the water (temperature, visibility, electrical conductivity, pH-value, alkalinity). During the dry winter the number of plankton species and individuals was low. In summer, before the onset of the monsoon mass development of different micrometer-algae and Ceratium hirundinella occurred.--Copyright 1974, Biological Abstracts, Inc.
W75-02402

ECOLOGY OF SOME RARE AQUATIC PLANTS AT THE NORTHERN LIMIT OF THEIR RANGE, (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W75-02425

ALLOCHTHONOUS ORGANIC CARBON OF A MARL LAKE,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
R. G. Wetzel, and A. Otsuki.
Archiv fur Hydrobiologie 1973, Vol 73, No 1, p 31-56, February 1974. Also, Report COO-1599-66, (1974). 56 p.

Descriptors: *Organic compounds, *Carbon, *Lakes, Michigan, Hardness(Water), Detritus, Water properties, Inflow, Discharge(Water).
Identifiers: *Carbon flux, Lawrence Lake(Mich.), Detrital carbon.

Influxes of allochthonous detrital organic carbon to a small hardwater lake were analyzed in relation to their fate within and losses from the lake. Detrital organic carbon influxes partitioned into a particulate fraction and a dissolved fraction, were determined in water from an inlet of spring origin and after traversing through a marsh to the lake, another inlet stream at the headwaters and after traversing through the marsh, from groundwater where it enters within the lake, and from the outlet. Concentrations of organic carbon of inputs and losses were converted to budgetary figures by a detailed annual water budget. Groundwater input was determined by two independent methods. Dissolved organic carbon fractions increased significantly as the inlet streams passed through marshes prior to entering the lake. DOC of groundwater was very low but because of the volume of inflow constituted one-third of the annual allochthonous influx. Relative concentrations of humic fractions of DOC, analyzed by UV absorption and fluorescence of yellow organic acids, of inputs fol-

lowed similar patterns. Particulate organic carbon of the influxes, within the lake, and in the outflow was consistently about 1/10th that of the DOC. (Jones-Wisconsin)
W75-02481

PHOSPHORUS, IRON, AND MANGANESE DISTRIBUTION IN SEDIMENT CORES OF SIX WISCONSIN LAKES,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 5B.
W75-02493

MICROFAUNA OF FEW EULITTORAL HABITATS OF MICKOLAJSKIE LAKE WITH SPECIAL CONSIDERATION TO THE NEMATODES (NEMATODA),
Warsaw Univ. (Poland). Dept. of Hydrobiology.
For primary bibliographic entry see Field 5C.
W75-02500

BIOLOGICAL PRODUCTIVITY OF TWO SUBARCTIC LAKES,
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
G. G. Winberg, A. Falimov, V. V. Boullion, M. B. Ivanova, and E. V. Korostzova.
Freshwater Biology, Vol 3, No 2, p 177-197, 1973. 16 fig, 7 tab, 5 ref.

Descriptors: *Primary productivity, *Subarctic, *Lakes, Water temperature, Dissolved oxygen, Water chemistry, Photosynthesis, Phytoplankton, Zooplankton, Light intensity, Chlorophyll, Seasonal, Diatoms, Cyanophyta, Bacteria, Benthos, Biomass, Copepods, Crustaceans, Distribution, Energy budget.
Identifiers: Lake Zelenetzkoye(USSR), Lake Akulkino(USSR), Barentz Sea.

Investigations were made on two lakes, Zelenetzkoye and Akulkino, located in a hilly and stony tundra near the Barentz Sea coast. Most observations were made in the larger and deeper Lake Zelentzkoye. Measurements of water temperature and oxygen content were made at different depths. Primary production was ascertained from a few measurements made by the C-14 technique. It is difficult to draw any conclusions about how far the rapid decrease of photosynthesis with depth is due to slight penetration of light due to the low angle of the sun's incidence in high latitudes and how far to low concentration of bicarbonate. In the phytoplankton of Lake Zelenetzkoye 120 species were recorded. Among the blue-green algae attaining the greatest abundance by the end of the vegetative season are: Microcystis pulverea, Merismopedia tenuissima, Dactylococcus aviculoris and Coelosphaerium kuetzingianum. Observations of the reproduction rate of bacteria in water freed of zooplankton by filtration and exposed in bottles in the lake made it possible to determine the 'generation time', the time during which the number of bacteria is doubled. The zooplankton in both lakes is very poor, only consisting of seven Copepoda species and nine Cladocera species. (Jones-Wisconsin)
W75-02501

PETROLEUM-DERIVED AND INDIGENOUS HYDROCARBONS IN RECENT SEDIMENTS OF LAKE ZUG, SWITZERLAND,
Eidgenoessische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewaesserschutz, Zurich (Switzerland).
W. Giger, M. Reinhard, C. Schaffner, and W. Stumm.
Environ Sci Technol, 8(5): 454-455, 1974, Illus.

Descriptors: *Organic compounds, *Lake sediments, Switzerland.

Presented are hydrocarbon analyses of recent sediments from Lake Zug, Switzerland. The sediments near the densely populated northern shores of the lake contain large amounts of hydrocarbons, predominantly derived from fossil fuels; indigenous hydrocarbons, presumably derived from aquatic organisms, predominate in the middle part of the lake, adjacent to less densely populated areas.--Copyright 1974, Biological Abstracts, Inc.
W75-02510

THE SILVER FLOWE: I. SOME STRUCTURAL AND HYDROLOGICAL FEATURES OF BRISHIE BOG AND THEIR BEARING ON POOL FORMATION,
Hull Univ. (England). Dept. of Botany.
D. J. Boatman, and R. W. Tomlinson.
J Ecol, 61(3): 653-666, 1973, Illus.

Descriptors: *Bogs, Scotland, Water levels, Peat, Drainage.
Identifiers: Brishie Bog.

Brishie Bog (Scotland, United Kingdom) is divided by a valley into 2 lobes of approximately equal area. Large, fairly deep pools occur on the eastern lobe but are absent from the western lobe. The distribution of drainage features, natural and/or man-made, in the area surrounding the bog are such that more water would be directed to the eastern than the western lobe. The evidence does not support the view that pools are formed by the tearing or wrinkling of the surface layers of the peat. Periodic measurements of water level indicated that the mean water level was closer to the surface in the pool area than elsewhere on the bog. Continuous records of water level obtained from Munro recorders suggested that water moved laterally only through the upper 6 cm of the peat; below this depth changes in water level could be explained by evaporation alone. In dry periods the level of water in a pool dropped at approximately the same rate as in a continuous peat surface. It does not appear therefore that the hydraulic properties of the peat around a pool are significantly different from peat elsewhere on the bog.--Copyright 1974, Biological Abstracts, Inc.
W75-02511

LIMNOLOGICAL STUDIES ON FRESHWATER PONDS OF HYDERABAD, INDIA,
Canada Centre for Inland Waters, Burlington (Ontario).
M. Munawar.
Hydrobiologia, 44(1): 13-27, 1974, Illus.

Descriptors: *Limnology, *Ponds, India, Phytoplankton.
Identifiers: Cyanophyta, Diatomeae, Euglenineae.

Seasonal abundance of phytoplankton in 3 tropical ponds of Hyderabad, India during 2 yr of investigation is discussed. The observed patterns have been characterized as seasonal maxima and minima during summer, monsoon and winter. The tropical patterns observed in the study ponds were typical but different from those observed in temperate regions. Most of the maxima were observed in winter and the minima during the monsoon or rainy season. Diatomeae dominated the phytoplankton of all the ponds in all seasons. An inverse relationship between Diatomeae and Cyanophyta, and Diatomeae and Euglenineae was observed. The phytoplankters have been grouped as perennial, summer, monsoon and winter species.--Copyright 1974, Biological Abstracts, Inc.
W75-02512

PHYSICAL AND CHEMICAL FEATURES OF AN AESTIVAL POND IN WESTERN CANADA,
Acadia Univ., Wolfville (Nova Scotia). Dept. of Biology.
G. R. Daborn, and H. F. Clifford.
Hydrobiologia, 44(1): 43-59, 1974, Illus.

Descriptors: *Ponds, Physical properties, Chemical properties, Canada, Aestivation.

Aestival ponds are shallow, semi-permanent water bodies that retain some water throughout the year, but freeze to the bottom during the winter. They are characteristically found at high latitudes or altitudes and present special conditions as environments for aquatic life. A study of such a pond in western Canada revealed 2 distinct seasons: an open-water season extending from March to Nov., during which water volume decreased considerably through evaporation and a winter season in which all water remaining in the basin was frozen. Transitional periods between these 2 seasons were short. As water volume decreased during the summer, increases were noted in the specific conductance and hardness of the remaining water, whereas bicarbonate alkalinity was found to be directly correlated with rainfall alone. Values of other chemical constituents examined exhibited no distinct patterns. The formation of ice in early winter resulted in increases in all ion concentrations in the underlying water, just as occurs during the formation of sea ice. Furthermore, as the ice cover increased in thickness, the water beneath became supersaturated with dissolved O2. The consequences of this cryogenic 'salting out', are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-02513

THE LIMNOLOGY OF A THERMAL LAKE, LAKE ROTOWHERO, NEW ZEALAND: II. GENERAL BIOLOGY WITH EMPHASIS ON THE BANTHIC FAUNA OF CHIRONOMIDS,
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Ecology Div.
D. J. Forsyth, and R. H. S. McColl.
Hydrobiologia, 44(1): 91-104, 1974, Illus.

Descriptors: *Limnology, *Benthic fauna, Lakes, New Zealand.
Identifiers: Chironomids, Chironomus zealandicus, Chlorella, Lake Rotowhero.

Lake Rotowhero, a warm thermal lake in the thermal region of North Island, New Zealand, has seasonal temperatures varying between 29.5-37.5C, an average water pH of 3.1 and is highly eutrophic. It supports a dense population of Chlorella spp. throughout the year. The distribution of the exclusively insect macrofauna dominated by the benthic midge, Chironomus zealandicus Hudson is limited by temperature.--Copyright 1974, Biological Abstracts, Inc.
W75-02514

RELATIONSHIP BETWEEN NUTRIENT CONCENTRATION, PHYTOPLANKTON DENSITY, AND ZOOPLANKTON DENSITY IN NUTRIENT ENRICHED EXPERIMENTAL PONDS,
Kansas Univ., Lawrence. Dept. of Systematics and Ecology.
W. J. O'Brien, and F. De Noyelles, Jr.
Hydrobiologia, 44(1): 105-125, 1974, Illus.

Descriptors: *Phytoplankton, *Zooplankton, *Ponds, Nutrients, Limnology, Chlorophyll, Nitrogen, Phosphorus.

The effects of different levels of nutrient input on the plankton community was investigated in a 2-yr controlled fertilization study of 8 experimental ponds. There were 4 treatments, each replicated: a control, to which no fertilizer was added, and 3 levels of nutrient addition. Limnological parameters including phytoplankton and zooplankton densities were measured frequently during both summers and less frequently during the rest of the year. Inorganic N and P concentrations in the treated ponds increased. Phytoplankton and zooplankton density increased with treatment level but was variable. There was a limited relationship between the average chlorophyll a concentration/summer and the average cladoceran dry weight/summer. Above chlorophyll a concentrations greater than 60-70 mg/cu m other factors, such as a pH zooplankton mortality effect,

prevailed.--Copyright 1974, Biological Abstracts, Inc.
W75-02515

A GUIDE TO STATISTICAL METHODS FOR THE ANALYSIS OF SAMPLES OF BENTHIC INVERTEBRATES, (IN FRENCH),
Freshwater Biological Association, Ambleside (England).
J.-M. Elliott, and H. Decamps.
Ann Limnol, 9(2): 79-120, 1973, Illus. English summary.

Descriptors: *Benthic fauna, Sampling, Statistical methods.

The problems of planning a sampling program for extensive faunal surveys and intensive quantitative studies are discussed. Methods are given for describing a sample in statistical terms. The spatial dispersion of a population is discussed, and the basic types of spatial distribution are described. Methods are given to test if the dispersion of a population is random, regular or contagious. The problems of estimating numbers/unit area or /unit volume are discussed, and methods are given to calculate confidence limits for these estimates. Both parametric and non-parametric methods for the quantitative comparison of 2 samples are described and the uses of X2 and contingency tables are discussed. A final section briefly discusses the problems of sampling in the field and subsampling in the laboratory.--Copyright 1974, Biological Abstracts, Inc.
W75-02517

PRESENT DATA ON LAKE TCHAD AND ITS PRODUCTIVITY,
Museum National d'Histoire Naturelle, Paris (France). Laboratoire des Peches Outre-Mer.
B. H. Dussart.
Bull Mus Natl Hist Nat Ecol Gen, 8, p 145-162, 1973, Illus. In French with French and English summary.

Descriptors: *Limnology, Lakes, Chad.
Identifiers: *Lake Chad.

Lake Chad (NW central Africa) is characterized by large and periodic fluctuations of its level, flora and fauna. Its productivity is about twice that of temperate mesotrophic lakes. A salinity gradient is noted in the north part of the lake but it remains a freshwater lake. It is exploited regionally by man.--Copyright 1974, Biological Abstracts, Inc.
W75-02519

A LIMNOLOGICAL SURVEY OF LAKE MAINIT, PHILIPPINES,
Savannah River Ecology Lab., Aiken, S.C.
W. M. Lewis.
Int Rev Gesamten Hydrobiol, 58(6): p 801-818, 1973.

Descriptors: *Limnology, Lakes, Philippines.
Identifiers: *Lake Mainit.

Morphology, bathymetry and climate are described for Lake Mainit, 1 of the principal lakes of Southeast Asia. Thermal and water chemistry data show that the lake is not meromictic, despite its great depth, and that the water is dilute. Primary production is high but standing crop and diversity of phytoplankton and zooplankton range from moderate to low. The species composition of plankton and other biota is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-02520

LIMNOLOGICAL FEATURES OF POSTOAK LAKE, COLLEGE STATION, TEXAS,
Bangladesh Agricultural Univ., Mymensingh. Dept. of Aquiculture and Management.
A. Karim.
Pak J Sci Res. Vol 24, No 1/2, p 5-10, 1972.

Descriptors: *Limnology, Lakes, Texas.
Identifiers: *Postoak Lake.

The result of a 12-mo. study of limnological features of Postoak Lake, Range and Forestry Area, Texas A and M University, are presented. The Lake has a surface area of approximately 1.87 acres and a maximum depth of 11.5 ft. The lake was practically devoid of submerged or floating aquatic vegetation. The pH was slightly above 7.0 all yr. The temperature of water 1 in. above the bottom never fell below the 8C recorded on Jan., 1967. The lake was thermally stratified in summer and in late fall. Sand bottoms predominated in the shallower waters while mud bottoms were associated with the profundal zone. The percentage of organic material (oven dry weight) in samples of the bottom ranged from 1.77-4.26 and increased with depth.--Copyright 1974, Biological Abstracts, Inc.
W75-02521

TUBIFICIDS ALTER PROFILES OF REDOX POTENTIAL AND PH IN PROFUNDAL LAKE SEDIMENT,
Maine Univ., Orono. Dept. of Botany and Plant Pathology.
R. B. Davis.
Limnol Oceanogr. Vol 19, No 2, p 342-346, Illus. 1974.

Descriptors: *Tubificids, Lakes, *Oxidation-reduction potential, *Hydrogen ion concentration.

At 10C tubificids increased the redox potential of profundal lake sediment at 1-4-cm depth, with greatest average increases (294 and 241 mV) at 2 and 3 cm. The oxidized layer (>200 mV) was deepened 0.3-1.6 cm. pH was decreased slightly in the upper 1-2 cm and below this was increased to depths > 14 cm.--Copyright 1974, Biological Abstracts, Inc.
W75-02526

CARBON DIOXIDE CONTENT AND METABOLIC ACTIVITY OF MICROORGANISMS IN SOME ACID LAKES IN JAPAN,
Tokyo Univ. (Japan). Ocean Research Inst.
K. Satake, and Y. Saijo.
Limnol Oceanogr. Vol 19, No 2, p 331-338. Illus. 1974.

Descriptors: *Lakes, *Carbon dioxide, Japan, Microorganisms.
Identifiers: Chlamydomonas acidophila, Lake Katanuma.

The CO2 content of the water of certain volcanic acid lakes was much higher than theoretically calculated values based on solubility in acid water. A portion of the CO2 was derived from volcanic gas and from volcanic gas and from in situ microbial decomposition of organic matter. Considerable photosynthesis by Chlamydomonas acidophila was observed in Lake Katanuma, having a pH of 1.8-2.0. Growth-pH relations of microalgae, a mold and a yeast isolated from Lake Katanuma distinguished both extremely acid tolerant and acidophilic types.--Copyright 1974, Biological Abstracts, Inc.
W75-02527

THE IN SITU CHEMOSTAT- A SELF-CONTAINED CONTINUOUS CULTURING AND WATER SAMPLING SYSTEM,
Oklahoma Univ., Norman. Dept. of Zoology.
F. De Noyelles, Jr., and W. J. O'Brien.
Limnol Oceanogr. Vol 19, No 2, p 326-331. Illus. 1974.

Descriptors: *Algae, Cultures, Sampling.
Identifiers: Chemostat, Sample preservation.

An in situ continuous (algae) culturing system requiring no external power source, put in a pond or lake, draws in either unaltered or automatically filtered water and passes a continuous flow through submerged culture chamber into collection chambers having a system for automatic preservation of the sample. Attached reservoirs allow the addition of nutrients or toxins, and a variety of other perturbations may be simulated by slight changes in the basic device. Such a device can also be used as a continuous water sampler with the automatic preservation system.--Copyright 1974, Biological Abstracts, Inc.
W75-02528

THE STABILITY OF MEROMICTIC LAKES IN CENTRAL WASHINGTON,
Australian National Univ., Canberra. Dept. of Environmental Biology.
K. F. Walker.
Limnol Oceanogr. Vol 19, No 2, p 209-222. Illus. 1974.

Descriptors: *Meromixis, Lakes, Temperature, Salinity.
Identifiers: Meromictic lakes, Schmidt equation.

Schmidt's stability concept is used in a comparsion of profiles of temperature and salinity for 6 meromictic lakes in 1953-1958 and 1972. The dual control of density in these lakes is emphasized by distinguishing 'thermal' from 'chemical' (or 'meromictic') stability. A slight modification of the Schmidt equation is made to yield a plot with depth of the minimum work required for destratification. Significant erosion of the salinity stratification has occurred in nearly all those lakes investigated, with consequent decreases in stability. Soap Lake, in the Lower Grand Coulee, has been considerably modified by dilution; 1 effect is to prolong the existence of meromixis by at least 20 yr.--Copyright 1974, Biological Abstracts, Inc.
W75-02530

CALORIFIC VALUES OF CHIRONOMIDAE (DIPTERA),
Alberta Univ., Edmonton. Dept. of Entomology.
V. J. E. McCauley, and K. Tsumura.
Can J Zool. Vol 52, No 5, p 581-586. 1974.

Descriptors: *Diptera, Lakes.
Identifiers: British Columbia, Chironomidae.

Calorific determinations were made on the larvae of 9 spp., and on the pupae and adults of 10 spp., of Chironomidae from Marion Lake, British Columbia (Canada). Combination of these data with those in the literature to obtain mean calorific values (+2 SE) for chironomid larvae, pupae, and adults gave values of 4802 + 165 g-cal/g dry wt (weight) and 5104 + 178 g-cal/g ash-free dry wt., 4828 + 136 g-cal/g dry wt. and 4975 + 129 g-cal/g ash-free dry wt., and 4947 + 78 g-cal/g dry wt. and 5019 + 72 g-cal/g ash-free dry wt., respectively.--Copyright 1974, Biological Abstracts, Inc.
W75-02534

CONTRIBUTION TO THE KNOWLEDGE OF PHYTOPLANKTON IN THE PROTECTED REGION OF THE SWAMPY AREA OF KOPACHEVO (KOPACKI RIT), (IN CROATIAN),
Pedagoska Akademiya, Osijek (Yugoslavia).
D. Gucunski.
Acta Bot Croat. 32, p 205-216, Illus, 1973. English summary.

Descriptors: *Phytoplankton, *Swamps, Yugoslavia.

In the protected region of the swampy area of Kopacki rit (Yugoslavia) in 1970 altogether 362 phytoplanktonic taxa, i.e., 303 spp., 45 var. and 14 forms belonging to Cyanophyta, Euglenophyta, Pyrrophyta, Chrysophyta, Chlorophyta, Mycophyta and 5 spp. of colorless flagelates without a definite systematic position were found.

The most numerous according to taxa were Chlorophyta (143) and Chrysophyta (114). Many of them are cosmopolitan and wide spread and some are indicators of eutrophic lakes.--Copyright 1974, Biological Abstracts, Inc.
W75-02546

FEEDING OF THE RIVER FORM OF THE MUKSUN COREGONUS MUKSUN (PALLAS) OF THE LENA RIVER IN CONNECTION WITH SOME CHARACTERISTICS OF ITS MORPHOLOGY, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Biology.
E. N. Aleksandrova.
Vopr Ikhtiol, Vol 13, No 6, p 1132-1134, 1973.

Descriptors: *Benthos, Plankton.
Identifiers: Coregonus-muskun, Derjuginia, Limnocalanus, Monoculodes, Muksun, Mysis, Pseudocalanus, Pseudolibrotus, Senecella.

An examination of the stomachs of the population of the muksun (Coregonus muksun) which spends its life in the Lena (USSR) and its tributaries showed that with respect to the character of feeding the muksun is euryphagous, feeding on benthos, nektobenthos and plankton (Limnocalanus grimaldii, Pseudocalanus major, P. elongatus, Derjuginia tolli, Senecella calanoides, Mysis relicta, Pseudolibrotus birulai, Monoculodes minutus are cited as food for C. muksun) at the bottom on the river. The inferior mouth of the muksun is simultaneously well adapted for feeding on plankton and benthos.--Copyright 1974, Biological Abstracts, Inc.
W75-02551

APPLICATION OF CORRELATION ANALYSIS TO THE STUDY OF CERTAIN ICHTHYOLOGICAL POPULATIONS OF LAKE CHAD, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre--Mer, Fort-Lamy (Chad).
J. R. Durand.
Cah ORSTOM Ser Hydrobiol. Vol 7, No 1, p 55-62. 1973 Illus.

Descriptors: *Correlation analysis, *Fish populations, Lake Chad.

Data have been collected since 1965 in Lake Chad with 2 1/2 in. gillnets. The results are expressed as mean nightly catch per 100 m2 and were studied by means of correlation analysis. Catch composition depends on landscape (archipelago and open water), seasonal variations connected with migrations and interannual changes (owing to fall in lake level).--Copyright 1974, Biological Abstracts, Inc.
W75-02562

THE EFFECT OF INCREASED WATER LEVEL FLUCTUATION UPON THE BROWN TROUT POPULATION OF MARVANN, A NORWEGIAN RESERVOIR,
Zoologisk Museum, Oslo (Norway).
R. Borgstrom.
Norw J Zool. Vol 21, No 2, p 101-112. 1973. Illus.

Descriptors: *Brown trout, Water levels, Reservoirs, Turbidity, Fish food organisms, Norway.

Increased lowering of the water level of Marvann, a Norwegian high mountain reservoir, during the winter 1969/70 resulted in an especially low water level the following summer. Heavy erosion of the exposed bottom took place and the turbidity increased considerably from 1969 to 1970. During 1971 and 1972 the water level again fluctuated within the previous limits, and the turbidity gradually decreased. In the years 1970-72 the yield of trout (Salmo trutta) in the main reservoir fell almost to zero. This was probably due to increased mortality, caused by an inadequate food supply, and increased emigration of trout to the clear water zones situated out from the main inlets. The reasons for the disappearance of the main food item, Lepidurus arcticus, are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-02563

GROWTH AND LIFE CYCLE OF BAETIS RHODANI (PICT.) (EPHEMEROPTERA), (IN DANISH),
J. Bengtsson.
Flora Fauna. Vol 79, No 2, p 32-34, 1973. Illus. English summary.

Descriptors: *Aquatic insects, Denmark.
Identifiers: Baetis-rhodani, Ephemeroptera.

The life-cycle of B. rhodani (Pict.) was investigated in a small spring-brook near Vegger (Denmark). The material consists of 909 nymphs and 267 imagoes collected from Sept., 1970-Nov., 1972. The species has 2 generations per year, a slowly growing overwintering generation with flying-time from April-June and a quickly growing summer-generation with flying-time from Aug.-Nov. There is some evidence in the histograms that the nymphs in summer are split up into 2 parts. The imagoes during Aug.-Nov. represent the quickest growing part. The rest grew slower and emerge the following spring together with specimens hatched from eggs laid by the imagoes Aug.-Nov. From body lengths of full-grown nymphs and imag., it is seen that the imagoes Aug.-Nov. are shorter than those of April-June. The proportion between the males and females found is approximately 1:3.--Copyright 1974, Biological Abstracts, Inc.
W75-02592

FEEDING OF THE ROACH RUTILUS RUTILUS (L.) WHEN CARP CYPERINUS CARPIO ARE FED ARTIFICIAL FOOD IN LAKES, (IN RUSSIAN),
Gosudarstvennyi Nauchno-Issledovatelskii Institut Ozernogo i Rechnogo Rybnogo Khozyaistva, Leningrad (USSR).
I. I. Tereshenkov.
Vopr Ikhtiol. 13(6): 1125-1127, 1973.

Descriptors: *Food fish organisms, *Carp, Fish diets, USSR.
Identifiers: Cyprinus carpio, Roaches.

The data on the feeding of the roach (R. rutilus) were collected in the Pskov region in lakes Demenets and Berezovoe (Russian SFSR, USSR) between June and August 1970 during the period of artificial feeding of carp (C. carpio) with barley. An examination of 208 roach intestines showed that the roach is a competitor of the carp for barley and therefore the roach must be removed from lakes being stocked with carp.--Copyright 1974, Biological Abstacts, Inc.
W75-02599

BURBOT LOTA LOTA (L.) IN THE UPPER TULOMA RESERVOIR, (IN RUSSIAN),
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Kybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
For primary bibliographic entry see Field 8I.
W75-02601

CULTIVATION OF THE COMMERCIAL PELED COREGONUS PELED (GMELIN) IN LAKE TITOVO IN THE NOVOSIBIRSK OBLAST, (IN RUSSIAN),
M. V. Volgin.
Vopr Ikhtiol, Vol 13, No 6, p 1099-1104, 1973.

Descriptors: *Fish farming, USSR.
Identifiers: Coregonus peled, Novosibirsk oblast, Peled, Lake Titovo.

The results of stocking Lake Titovo (Novosibirsk district, Russian SFSR, USSR) with larvae and fry of the peled (C. peled) after the local fish (perch and roach) were removed and the lake underwent reclamation works are presented. Stocking was done at several different times in 1968-1969. Good size-weight indices of the peled, its high condition factor and early sexual maturation were noted. Better results were obtained in the case of releasing fry. The peled grew in the lake and reached a weight of more than 500 g by the end of the 2nd yr.--Copyright 1974, Biological Abstracts, Inc.
W75-02603

THE SPECIALIZED FEEDING BEHAVIOR OF AMBYSTOMA GRACILE IN MARION LAKE, BRITISH COLUMBIA,
Nature Conservancy, Banchory (Scotland).
B. A. Henderson.
Can Field Nat, Vol 87, No 2, p 151-154, 1973.

Descriptors: *Crustaceans.
Identifiers: Ambystoma gracile, Marion Lake(BC).

Analysis of the stomach contents of A. gracile feeding in the water column and on the mud revealed a marked difference in prey eaten in the 2 areas. The cladoceran, Sida crystallina, predominated among the water column feeders, whereas amphipods, chironomids, and mollusks predominated among the benthic feeders. Larval and 2nd yr Ambystoma learned different feeding behaviors as reflected in the different stomach contents.--Copyright 1974, Biological Abstracts, Inc.
W75-02705

2I. Water In Plants

MOUNTAIN MIRES,
A. Persson.
Acta Phytogeographica Suecica, Vol 50, p 249-256, 1965. 3 fig.

Descriptors: *Bogs, *Alpine, *Vegetation, Fen, Mineral water, Soil water, Varieties, Springs, Peat, Hydrogen ion concentration, Calcareous soils.
Identifiers: *Mountain mires, Sweden.

The Scandinavian mountain mires are mainly developed as fens, i.e., they are supplied with mineral soil water. True bog vegetation is rare. The vegetation is described from areas of rich fen, intermediate fen, poor fen and bog, and springs. The differentiation of the mountain mire and spring vegetation along the rich-to-poor gradient runs parallel to differences in the acid-base status of the peat and the water. Approximate pH amplitudes in water from mires and springs in the Tornetrask area are given together with plant listings. Classified as rich, in calcareous reas, mountain fens are occupied by Scorpidium scorpioides communities in their wettest section. Intermediate fens, in non-calcareous areas in the northern coniferous forest region and in the mountains, contain vegetation characterized by Calliergon sarmentosum, C. stramineum, Drepanocladus exannulatus, D. badius, Paludella squarrosa and Sphagnum teres. In poor fen and bog areas, vegetation with Sphagnum riparium, the most important bottom layer species, has been described; it occurs in locations with upwelling or moving water. There are species which more or less obviously prefer springs, e.g., Cratoneurum, Philonotis fontana, Ph. seriata, Bryum Weigelii, Dicranella squarrosa and Scapania uliginosa. (Jones-Wisconsin)
W75-02281

HETEROPTERA OF THE RIVER RABA, SOME OF ITS TRIBUTARIES AND RIVERINE RESERVOIRS,
Polish Academy of Sciences, Poznan. Inst. of Zoology.
S. Mielewczyk.

Acta Hydrobiol. Vol 15, No 4, p 387-400, 1973, Illus.
Identifiers: Floods, *Heteroptera, Hibernation, Larvae, *Micronecta, *Poland(River Raba), Refugia, Reservoirs, Rivers, Tributaries, *Aquatic insects.

The Heteropteran fauna is much richer in riverine reservoirs than in the River Raba (Poland) and some of its tributaries. Scarcity of these insects in flowing waters is, however, not a secondary but a primary phenomenon resulting from the mountainous character of these waters. The division of these waters into characteristic section was made on the basis of the distribution of 2 spp. of the genus Micronecta and the proportion of the specimens of the brachypterous (short-winged) and macropterous (long-winged) forms. The presence of these species demonstrates high purity and low trophism in the populated waters. The 2 spp. of Micronecta develop only 1 generation and their larvae can hibernate not only in the IVth but also in the IIIrd stage. For some species the riverine reservoirs play the role of refugia during flood periods.--Copyright 1974, Biological Abstracts, Inc.
W75-02316

ASSOCIATION OF SOME SPECIES OF POND PHYTOPLANKTON, (IN RUSSIAN),
Z. I. Tsirul'skaya.
Biol Nauki. Vol 16, No 10, p 63-66, 1973.
Identifiers: Anabaena-spiroides, *Carp, Fish, *Herbivorous fishes, *Phytoplankton, Ponds, Sampling, *Anabaena.

Using a modified Fisher's method, 132 samples of phytoplankton from 8 adjacent rearing ponds stocked with carp and herbivorous fishes were studied to establish positive-associated pairs of algae. The majority of the algal species, 23 of 37, were associated with each other and therefore comprised an integral community consisting of algae of different taxonomic positions. Anabaena spiroides, which several times during the season practically displaced all other forms of algae, was a strong antagonist and was associated only with 8 other species.--Copyright 1974, Biological Abstracts, Inc.
W75-02380

ROLE OF HIGHER AQUATIC PLANTS IN SELF-PURIFICATION OF BODIES OF WATER, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
A. I. Merezhko.
Gidrobiol Zh, Vol 9, No 4, p 118-125, 1973.
Identifiers: *Aquatic plants, Mineralization, *Self purification, *Water purification, Absorption, Oxidation, Filtration.

A review of the literature showed the diverse aspects of the vital activity of higher aquatic plants related with self-purification of waters. Their filtration, absorption and accumulation functions, mineralization and oxidation of organic matter, and role in detoxification of noxious substances in bodies of water were determined. Present-day knowledge is insufficient to establish the participation of vegetation in any of the above processes.--Copyright 1974, Biological Abstracts, Inc.
W75-02410

DETERMINATION OF TOTAL NITROGEN IN PLANT MATERIAL,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
D. W. Nelson, and L. E. Sommers.
Agronomy Journal, Vol 65, No 1, p 109-112, January-February, 1973. 6 tab, 21 ref.

Descriptors: *Nitrogen, Nitrates, Digestion, Fertility, Crop response, *Plant tissues, Indiana, Fertilizers, Crop production.
Identifiers: *Nitrate-nitrogen.

A simple and precise procedure for estimating total N in plant tissue is described; a modification is also described for analysis of samples containing high nitrate concentrations. Plant tissue samples are placed in pyrex Folin-Wu tubes and digested with a salt-catalyst-sulfuric acid mixture by heating the tubes in an aluminum block. Samples are digested at the boiling point of the mixture for 60 min. after initial clearing of the digests. Analyses of diverse plant materials, containing from 0.006 to 0.3% Nitrate-N, indicated that the proposed and standard AOAC procedures yielded essentially the same total N values. The coefficient of variation for the proposed methods varied from 0.87 to 1.10%. The tube digestion procedures described allow digestion of 60 plant samples simultaneously and thus greatly improve the efficiency of total N determinations. (Skogerboe-Colorado State)
W75-02411

ROOTING DENSITY AND WATER EXTRACTION PATTERNS FOR CORN (ZEA MAYS L.),
Agricultural Research Service, Ames, Iowa.
H. M. Taylor, and B. Klepper.
Agronomy Journal, Vol 65, No 6, p 965-968, November-December, 1973. 3 fig, 4 tab, 12 ref.

Descriptors: *Hydraulic conductivity, Water utilization, Plant growth, Consumptive use, *Root distribution, *Root systems, *Corn(Field), Soil water.

Water-absorbing efficiency, per centimeter of root, of corn roots deep in the profile was compared with that of roots near the soil surface. Plants were grown in a rhizotron compartment with rainfall excluded by a metal cover over the soil. Soil water content was determined with a neutron probe; rooting density, from measurements of roots on the glass viewing surface of the compartment. Leaf area was calculated by a length-width method and plant height was measured daily. For the first weeks, transpiration exceeded pan evaporation, but toward the end of the experiment it was about half as much as pan evaporation. Water uptake per centimeter of root was affected most by soil hydraulic conductivity, and at a given conductivity, it was greater at lower root densities. For the conditions of these experiments, roots deep in the profile were probably more effective per centimeter of root for water uptake than shallow roots because they were younger and were in wetter soil. (Skogerboe-Colorado State)
W75-02421

SIMULATION OF DROUGHT AND ITS EFFECT ON GERMINATION OF FIVE PASTURE SPECIES,
Commonwealth Scientific and Industrial Research Organization, Deniliquin (Australia). Riverina Lab.
For primary bibliographic entry see Field 3C.
W75-02422

UTILITY OF A SIMPLE SOIL WATER BUDGET MODEL IN AGRONOMIC RESEARCH: 3. ESTIMATION OF THE POTENTIAL EVAPOTRANSPIRATION FUNCTION,
Sydney Univ., Narrabri (Australia). North West Wheat Research Inst.
For primary bibliographic entry see Field 2D.
W75-02480

DAILY TRANSPIRATION RATES OF RADIATA PINE,
New Zealand Forest Service, Rotorua.
D. S. Jackson, H. H. Gifford, and I. W. Hobbs.
N Z J For Sci. Vol 3, No 1, p 70-81. 1973. Illus.

Descriptors: *Transpiration, Pine trees.
Identifiers: Pinus radiata.

The factors affecting daily transpiration rates of individual trees (Pinus radiata) are briefly reviewed, together, with models of their relationship. Using experimental data for ramets of 7 radiata pine clones growing in volcanic sandy loam, the following equation is consturcted: t/e = 25.036-33.93 exp (0.07 (5-S))+1.311/E - 0.0074(S-5)2 for which t is daily transpiration per tree in ml per g o.d. (oven dry weight) wt of foliage; E is open-tank evaporation in cm/day; and, S is soil moisture content expressed as percentage of soil o.d. wt. This equation accounts for 53% of the overall variation. The residual variation may be reduced by a further 11% if coefficients are fitted to the individual clones. Differences of transpiration rates between clones are highly significant. Comparative data for soil water potential and needle pressure potential are also presented.--Copyright 1974, Biological Abstracts, Inc.
W75-02524

WATER CONSUMPTION IN WHEAT AND RYE AND ITS RELATIONS TO MANURING, YIELD, RAINFALL AND ROOT GROWTH, (IN GERMAN),
Bonn Univ. (West Germany). Institut fuer Bodenkunde.
D. Schroeder.
Z Acker Pflanzenbau. Vol 138, No 4, p 300-318. Illus. 1973. English summary.

Descriptors: *Consumptive use, *Rye, *Wheat.

Rye and wheat consumed in the period from the beginning of growth to the beginning of earing roughly the same amount of water under condtions of complete manuring and with deficiencies of P, K and Ca, whereas with deficiencies of N and the other fertilizers there was a significantly lower water consumption. During the period of earing to harvest, the differences in water consumption diminished. High consumption was noted in the plots with farmyard manure in the 1st growing period. The water consumption of rye and wheat was correlated in the various growing periods positively, sometimes significantly, with rainfall and temperature. The number of roots of the cerals without fertilizers was lower than those with N and K deficiencies; those with Ca and P deficiencies hardly showed a reduction. The amounts of roots and the yield of grain and straw wer independent of one another. With increasing water supplies the amount of root was apparently reduced.--Copyright 1974, Biological Abstracts, Inc.
W75-02538

TWO NEW VEGETAL ASSOCIATIONS FROM THE SAMOBORSKO GORJE REGION, (IN CROATIAU),
Institut za Botaniku, Zagreb (Yugoslavia).
For primary bibliographic entry see Field 4D.
W75-02545

PROBLEMATIC CONSIDERATIONS OF AQUATIC WEED CONTROL (ANALYSE DE LA PROBLEMATIQUE DU CONTROLE DE LA VEGETATION AQUATIQUE),
National Inst. of Scientific Research, Quebec.
J. L. Sasseville, and A. Rousseau.
INRS-Eau, Technical Report No 43, 34 p, 1 append.

Descriptors: *Aquatic weed control, *Aquatic plants, *Aquatic weeds, Phreatophytes, Vascular tissues, *Weed control.
Identifiers: *Aquatic plant control, *Mechanical harvesting, *Mechanical control, Macrophytes, Vascular plants.

The problematic considerations of aquatic weed control deal with some rudiments of the ecology of weeds and with descriptions of the different control methods (mechanical, chemical and biological). A pertinent litterature survey is annexed.
W75-02578

DROUGHT FEEDING OF SHEEP: III. THE RELATIVE IMPORTANCE OF COMPONENTS OF WOOL GROWTH IN EXPLAINING THE WOOL GROWTH DIFFERENCES BETWEEN STRAINS AND DIET,
New South Wales Dept. of Agriculture, Glenfield (Australia). Veterinary Research Station.
D. G. Saville, A. C. Gleeson, and W. R. Mc Manus.
Aust J Exp Agric Anim Husb. Vol 13, No 60, p 27-34, 1973. Illus.

Descriptors: *Sheep, Grasslands, Arid lands.
Identifiers: Components, Density, Diameter, Diets, Drought, Feeding, Fiber, Follicle, Growth, Length, Relative, Sheep, Staple, Strains, Wool.

The changes in wool components with differences in wool growth resulting from differences in strain of sheep and diet, and the importance of these in relation to selecting a strain of Merino for the drier pastoral areas were reported. Measurements of body weight, fold score, staple length, fiber diameter and follicle density were taken from Collinsville, Peppin and Bungaree ewes grazing natural pasture at Trangie and also when given a maintenance ration containing different grains, different protein supplements and formaldehyde treatment of these protein supplements. At pasture the Collinsville strain produced more wool with little increase in fiber diameter, when compared with the Peppins. This resulted in the Collinsville strain being more profitable under pasture conditions than either the Peppins or Bungarees. When given a survival ration, similar changes in wool growth and components occurred in each strain helping to maintain the profitable advantage of the Collinsvilles. The effect of the dietary treatments on wool growth occurred mainly through changes in fiber diameter and length. It is concluded that the choice of a particular strain of sheep for use in drier areas should not be influenced by the nutritional environment under which they are chosen.--Copyright 1973, Biological Abstracts, Inc.
W75-02597

OSCILLATORY TRANSPIRATION AND WATER UPTAKE OF AVENA PLANTS: I. PRELIMINARY OBSERVATIONS,
Lund Univ. (Sweden). Dept. of Electrical Measurements.
A. Johnsson.
Physiol Plant. 28(1): 40-50, Illus. 1973.

Descriptors: Transpiration, *Plant growth, *Oats, Crops, Cereal crops, Field crops, Grasses, *Crop response.
Identifiers: Avena-sativa, Water uptake.

Oscillations in transpiration and water uptake of individual, young oat (A. sativa) plants were studied. The free-running period of these oscillations was about 30 min. Conditions were reached under which the oscillations were sustained for about 2 days. Short perturbations were given to the transpiration oscillations, the perturbations consisting of a short time increase or decrease in illumination. The phase shifts of the oscillations as well as the amplitude effects caused by these perturbations were investigated. Simultaneous recordings of transpiration and water uptake of a single plant showed that these functions were oscillating in phase. Both oscillations disappeared if the leaf was excised.--Copyright 1974, Biological Abstracts, Inc.
W75-02598

VEGETATION DYNAMICS OF THE NATURAL LEVEES AND CHANNELS OF THE ANCIENT AND MODERN DELTA OF THE SYR-DARYA RIVER, (IN RUSSIAN),
F. N. Chalidze.
Ekologiya, Vol 4, No 3, p 24-30, Illus, 1973.

Descriptors: Channels, Levees, Embankments, *Deltas, *Vegetation, Crop response, Groundwater, Particle size, Alluvium, Sediments, Asia.
Identifiers: Syr-Darya, USSR.

Plant successions on the natural levees and channels of the ancient Kzyl-Orda and modern Kazalinsk delta of the Syr-Darya River (USSR) were studied. The development of the vegetation of the levees and channels in the deltas has been affected mainly by a decrease of the groundwater level at all stages of development of the vegetation, by a change of the particle-size distribution of alluvium at its initial stages, by deflation of the sand alluvium, and, consequently, by the change of its particle-size distribution at the final stages of the alluvium. The vegetation change during desertification is to some extent reversible. In the case of a rise of the groundwater level the development of the vegetation occurs in the opposite direction, returning to the initial stages.--Copyright 1974, Biological Abstracts, Inc.
W75-02605

A BENTHIC STUDY OF THE AVON SPRING STREAM, CHRISTCHURCH,
Canterbury Univ., Christchurch (New Zealand). Dept. of Zoology.
J. W. Marshall.
Mauri Ora, Vol 1, p 79-90, 1973.

Descriptors: *Springs, Running waters, Bodies of water, Analysis, Aquatic life, *Analytical techniques, Benthos, Aquatic plants.
Identifiers: Amphipoda, Avon, Mollusca, New Zealand, Oligochaeta, Platyhelminthes, Dillution technique.

The Avon Stream (Christchurch, New Zealand) arises from 1 helocrene and 4 rheocrene springs. These have a constant flow into a small moderately fast stream with a bed of clay, mud and patches of weed. Oxygen, temperature, pH, cross sectional area and flow were measured in conjunction with biological sampling. Oxygen saturation of the spring water was constant at 51% while downstream it showed a diel fluctuation. Animal density ranged from 100-500/0.1 sq m. Oligochaeta, Amphipoda and Mollusca were the most abundant faunal groups while Platyhelminthes were noticeably less common. A dilution technique for increasing counting accuracy is described. A biotope for the spring stream is proposed.--Copyright 1974, Biological Abstracts, Inc.
W75-02606

THE EFFECTS OF CULTIVATION TREATMENT ON WATER POTENTIAL AND SOIL AERATION IN WET HEATHLAND WITH SPECIAL REFERENCE TO AFFORESTATION,
Sheffield Univ. (England). Dept. of Botany.
D. J. Read, W. Armstrong, and J. Weatherell.
J Appl Ecol, Vol 10, No 2, p 479-487, Illus, 1973.

Descriptors: *Forest management, *Irrigation practices, *Reforestation, Forest soils, Aeration, *Soil-water-plant relationships, *Drainage effects.
Identifiers: Aeration, Cultivation, Drainage, Forestation, Heathland, Microbial, Nutrients, Potential, Soil, Treatment, Water, Wet.

A preliminary assessment of a new cultivation treatment designed to increase the drainage and aeration of wet heathland soils is described. This involves construction of elevated ridges (riggs) separated by deep furrows (furrs). Reduced water potentials down to 60 cm in the rigg indicate that improved drainage is obtained, and measurements of O2 status show that this improvement is associated with an increase of aeration. These changes improve the growth of planted trees 8 yr after establishment. The better growth on riggs is probably due to a combination of deeper rooting and increased microbial release of nutrients. The construction of larger riggs and their more extensive application are recommended.--Copyright 1974, Biological Abstracts, Inc.
W75-02607

MINERAL NUTRITION AND WATER RELATIONS OF FRESHLY TRANSPLANTED SPRUCE, (IN GERMAN),
Hochschule fuer Bodenkultur, Vienna (Austria). Institut fuer Forstliche Standdartsforschung.
G. Glatzel.
Centralbl Gesamte Forstwes. Vol 90, No 2, p 65-78. 1973 Illus. English summary.

Descriptors: *Soil-water-plant relationships, Nutrition fertilizers, Pine trees.
Identifiers: *Picea abies, Spruce, Plant nutrition.

In a pot experiment the effects of the transplantation on growth, mineral nutrition and water relations of 4 yr old spruce (Picea abies) plants were studied. The experiment which included both a fertilized and an unfertilized series gave the following results. Shoot and root development of the freshly transplanted spruce depended to a great extent on the reserves of organic and mineral substances within the plant. By applying mineral fertilizer immediately after planting, the growth response during the 1st growing season could not be notably improved. This is in full accordance with the results of a field experiment. A significant increase of the weight of the young shoots (defoliated) and buds provided the basis for increased shoot growth during the 2nd growth season after transplanting and thus for a reduction of the adverse effects of planting check on leader growth. Measurement of water uptake by the plants showed that mineral fertilization was able to induce a drastic reduction of water consumption during the 1st half of the growing season. The physiological mechanism for this was not studied but from literature references the assumption that unfertilized plants suffer from stomatal malfunctioning caused by poor nutritional status after transplanting seems reasonable. The existence of very strong interrelationships between nutritional status and water relations of the plants was shown.--Copyright 1974, Biological Abstracts, Inc.
W75-02644

EFFECTS OF VARYING DEGREES OF WATER RESTRICTION ON THE DISTRIBUTION OF BODY WATER IN HIGH- AND LOW-POTASSIUM-TYPE MARWARI SHEEP,
Central Arid Zone Research Inst., Jodhpur (India). Div. of Animal Studies.
G. R. Purohit, P. K. Ghosh, and G. C. Taneja.
J Agric Sci. Vol 80, No 2, p 177-180. 1973 Illus.

Descriptors: *Sheep, Water consumption, Potassium.
Identifiers: Body water.

The distribution of body water in the different body compartments of 4 high-potassium (HK) and 4 low-potassium (LK) type sheep of the Marwari breed of the Rajasthan desert was determined after imposing the following watering treatments, watering ad lib., 1/4, 1/2 and 3/4 restrictions (each of 5 days' duration with a 7 day normal drinking regime between each treatment) and water deprivation (of 3 days' duration). There was no difference in the voluntary water intake of the HK and LK animals. The HK animals normally have a higher blood and plasma volume status than the LK. In both types of animals, the total body water, total blood and plasma volumes and the extracellular, intracellular and interstitial fluid volumes started decreasing as water intake was reduced below 25% of the daily requirement. In both the phenotypes 75% reduction was similar in its effect to complete deprivation. The physiological status of the HK Marwari animals appears to be somewhat superior to that of the LK, although both types seem to be equally adapted to the conditions of the habitat.--Copyright 1973, Biological Abstracts, Inc.
W75-02681

THE INFLUENCE OF RAINFALL ON THE YIELD ON RAIN-FED RICE AT KARJAT (COLABA DISTRICT),
Indian Agricultural Research Inst., New Delhi.
P. S. Sreenivasan, and J. R. Banerjee.
Agric Meteorol, Vol 11, No 2, p 285-292, 1973, Illus.

Descriptors: *Rainfall, *Rice, *Crop production, India.

The series of yields of the 'K-42' cultivar of rice (Oryza sativa) grown under the seasonal plot at Karjat Agricultural Experimental Station (India) since 1923 and the corresponding rainfall series were subjected to statistical analysis by the 'Fi,her's response curve' technique, and by screening the data for 'sensitive periods of response.' The yield series show a strong secular trend, as do the series of linear, quadratic and quintic components of the polynomial. Nevertheless, the multiple correlation coefficients before as well as after the removal of the trend are not significant, indicating thereby that the integrated influence of rainfall on rice at Karjat is not of serious consequence. Rice at Karjat appears to respond favorably to rain during the critical phase of panicle primordial initiation. Rainfall in the period immediately preceeding harvest depresses the yield.--Copyright 1973, Biological Abstracts, Inc.
W75-02714

AN IMPROVED BIO-ASSAY FOR ABSCISIC ACID AND OTHER ANTITRANSPIRANTS,
Lancaster Univ. (England). Dept. of Biological Sciences.
A. B. Ogunkanmi, D. J. Tucker, and T. A. Mansfield.
New Phytol, Vol 72, No 2, p 277-282, 1973, Illus.

Descriptors: Stomata, *Bioassay, Abscisic acid, *Antitranspirants.
Identifiers: Auxin, Commelina communis, Coumarin, Gibberellic acid, Kinetin, Scopoletin, Xanthinin.

A greatly improved method is described for the bio-assay of abscisic acid (ABA) and other compounds that possess 'antitranspirant' activity. As in the previous method, the stomatal responses are observed on pieces of isolated epidermis of Commelina communis immersed in small volumes of solution containing the compounds to be assayed. In new media, it is now possible to obtain linear responses to ABA concentrations over the range 10-4-10-8 M in PIPES buffer at pH 6.8, and over the range 10-7-10-10 M in citrate buffer at pH 5.5. In citrate buffer, it is possible to detect as little as 26 pg of ABA. In both media, the assay is unaffected by the presence of 6 other growth regulators (auxin, gibberellic acid, kinetin, coumarin, xanthinin and scopoletin) but the stomata closed partially in response to 10-3 M chlorogenic acid.--Copyright 1973, Biological Abstracts, Inc.
W75-02719

STUDIES ON THE FLOATING RICE: III. EFFECTS OF RAISING WATER LEVEL ON THE GROWTH AND CARBOHYDRATE CONTENTS OF THE TOPS, (IN JAPANESE),
Kobe Univ. (Japan). Faculty of Agriculture.
T. Yamaguchi.
Proc Crop Sci Soc Jap, Vol 42, No 1, p 29-34, 1973, Illus, English summary.

Descriptors: *Rice.
Identifiers: Carbohydrates, Sugars.

Some varieties of floating and non-floating rice were grown under submerged conditions by raising the water level at a slow rate of 3 cm/day for 23 days followed by a rapid rate of 11 cm for 12 days. Growth and carbohydrate of the floating and non-floating rice were compared to those in ordinary condition. Total internode length, leaf number and plant height tended to increase under submerge condition and the response was more striking in the floating rice. Dry matter of the non-floating rice decreased with growth under the submerged condition when the rate of water level raising was rapid, but that of floating rice increased even at the rapid rate. Under ordinary conditions, the contents and concentrations of reducing and non-reducing sugars (especially of the former) were larger, but the concentration of crude starch was lower in floating rice than in the non-floating rice, respectively. In floating rice, the content of reducing sugar become larger under submerged conditions when the rate of raising water level was slow, and remained at a similar value when the rate was rapid as compared to that in ordinary conditions. In non-floating rice the content of reducing sugar was markedly reduced under submerged conditions when the rate was rapid. The contents and concentrations of non-reducing sugar and crude starch decreased under submerged conditions, but the rate of decrease was lower in floating rice than in the non-floating rice. These results suggest that the larger increase in total internode length of floating rice under submerged conditions is closely related to the increase in reducing sugar content within plant.--Copyright 1974, Biological Abstracts, Inc.
W75-02722

2J. Erosion and Sedimentation

POLLEN PROFILES OF LATE PLEISTOCENE AND RECENT SEDIMENTS FROM WEBER LAKE, NORTHEASTERN MINNESOTA,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
M. Fries.
Ecology, Vol 43, No 2, p 295-308, 1962. 10 fig, 1 tab, 53 ref.

Descriptors: *Lakes, *Geologic history, *Climates, *Vegetation, Minnesota, Cores, Stratigraphy.
Identifiers: Late Pleistocene, Weber Lake(Minn).

This study was conducted to obtain a survey of the late-glacial and post-glacial vegetation and climate history in northeastern Minnesota. The pollen diagrams are based on material from the sediments of little Weber Lake in Lake County, within the transitional forest region extending between the deciduous forest to the south and the boreal forest to the north. Zone 1 (NAP dominance and rather high Picea values) represents a stage of open country with spruce scattered or in groups, shrubs, graminids, and herbs. Zone 2 (decreasing NAP and high Betula) forms the beginning of the post-glacial forest period. Zone 3 (decreasing Picea and increasing Pinus values, maxima Quercus, Ulnus, etc.) may correspond to a conifer-hardwood forest probably indicating a climate warmer than today's. Zone 4 (dominating Pinus and increasing Alnus and Betula) corresponds with a gyttja layer, on top of which was a radiocarbon data 7,300 plus or minus 140. Zone 5 (Pinus dominance) shows low Picea, Alnus, Betula, etc. Zone 6 shows a reduction of the Pinus dominance. Zone 7 is characterized by increasing amounts of Picea, Abies, and Larix pollen, reflecting local expansion of the surrounding bog with its cover of black spruce and intermixture of Larix and Thuja. (Jones-Wisconsin)
W75-02278

PRESENT AND HISTORIC GEOCHEMICAL RELATIONSHIPS IN FOUR MAINE LAKES,
Maine Univ., Orono. Dept. of Geological Sciences.
For primary bibliographic entry see Field 5C.
W75-02359

TEMPORAL VARIABILITY OF SUSPENDED MATTER IN ASTORIA CANYON,
Oregon State Univ., Corvallis. School of Oceanography.
W. S. Plank, J. R. V. Zaneveld, and H. Pak.
Journal of Geophysical Research, Vol 79, No 30, p 4536-4551, October 20, 1974. 4 fig, 22 ref.

Descriptors: *Sedimentology, *Sediment transport, *Marine geology, *Submarine canyons, Oceanography, Ocean circulation, Ocean waves, Tides, Bathymetry, *Oregon.
Identifiers: *Astoria Canyon(Ore), Nephelometer profiles.

Suspended matter in Astoria canyon was monitored by means of an in situ nephelometer and by means of light-scattering and particle concentration measurements performed aboard ship on water samples. Nephelometer profiles obtained along the axis of the canyon in February and April 1973 indicate that the canyon is divided into two distinct zones: a nearshore zone in which the suspensoid distribution undergoes large changes and an offshore zone in which the distribution varies to a much lesser degree. A 15-hour time series of light-scattering and particle concentration profiles at a depth of 1100 m in the canyon shows extensive and rapid changes in suspended matter concentration at several depths. The effect of non-steady state distributions of suspended matter on calculations of the coefficient of eddy diffusivity was examined and shown to be an important consideration in a submarine canyon. (Gibb-ISWS)
W75-02377

STUDY OF FINE MATERIAL IN SUSPENSION IN THE ESTUARY OF THE LOIRE AND ITS DYNAMIC GRADING,
Institut Scientifique et Technique des Peches Maritimes, Nantes (France). Laboratoire de Geologie Marine.
For primary bibliographic entry see Field 2L.
W75-02387

LIGHT TRANSMISSIVITY, SUSPENDED SEDIMENTS AND THE LEGAL DEFINITION OF TURBIDITY,
University of South Florida, St. Petersburg. Marine Science Inst.
For primary bibliographic entry see Field 5A.
W75-02389

PHOSPHORUS, IRON, AND MANGANESE DISTRIBUTION IN SEDIMENT CORES OF SIX WISCONSIN LAKES,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 5B.
W75-02493

VEGETATION DYNAMICS OF THE NATURAL LEVEES AND CHANNELS OF THE ANCIENT AND MODERN DELTA OF THE SYR-DARYA RIVER, (IN RUSSIAN),
For primary bibliographic entry see Field 2I.
W75-02605

ESTIMATING AVERAGE SEDIMENT YIELDS FROM ANNUAL STREAMFLOW AND SEDIMENT RECORDS,
Geological Survey, Fort Collins, Colo.
C. F. Nordin, and G. V. Sabol.
In: Sediment Transportation; Vol 1 of Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, January 9-12, 1973, Bangkok, Thailand: Asian Institute of Technology, Bangkok, p 93-104, 1973. 5 fig, 2 tab, 4 ref.

Descriptors: *Sediment yield, *Streamflow, *Statistical methods, Correlation analysis, Markov processes, Erosion, Runoff, Estimating, Forecasting.

Where simultaneous streamflow and sediment discharge records are available, linear relations between annual streamflow and annual sediment

loads can be developed. These relations then can be used to estimate annual sediment yield and long-term average sediment yield for periods of time when only streamflow records are available. In all cases, estimates of long-term average sediment yield can be improved by extending the sediment record. The same criterion can be applied to series for which the logarithms of the flows and sediment loads are linearly related, and to series containing autocorrelation that can be represented approximately as first-order Markov processes. (Knapp-USGS)
W75-02669

AN INVESTIGATION OF THE SUSPENDED LOAD TRANSPORT EFFICIENCY IN THE BAGNOLD EQUATION,
Geological Survey, Fort Collins, Colo.
J. P. Bennett.
In: Sediment Transportation; Vol 1 of Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, January 9-12, 1973, Bangkok, Thailand: Asian Institute of Technology, Bangkok, p 455-463, 1973. 3 fig, 9 ref.

Descriptors: *Sediment transport, *Equations, *Alluvial channels, *Suspended load, Hydraulics, Open channel flow, Settling velocity, Particle size.
Identifiers: Bagnold equation.

In alluvial channel design the fall velocity of the suspended sediment is not known, and it is impossible to obtain much better than a rough estimate of the hydraulics of the flow. An equation such as Bagnold's would be extremely useful for predicting design sediment discharge, because the primary variable in the equation is the stream power. For known channel slope, the stream power is simply the product of the unit water discharge and the channel slope. Thus, precise estimates of flow hydraulics are not necessary for a design equation such as Bagnold's. Using flume data for sediments with a wide range of bed material sizes, efficiency of transport was found to be a strong function of stream power and bed sediment fall diameter. (Knapp-USGS)
W75-02670

FLUME STUDIES WITH FINE AND COARSE SAND, A PRELIMINARY ANALYSIS,
Geological Survey, Fort Collins, Colo.
C. F. Nordin, and L. A. Rundquist.
In: Sediment Transportation; Vol 1 of Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, January 9-12, 1973, Bangkok, Thailand: Asian Institute of Technology, Bangkok, p 501-511, 1973. 3 fig, 1 tab, 8 ref.

Descriptors: *Sediment transport, *Model studies, *Flumes, *Bed load, Sedimentary structures, Sand waves, Dunes, Channel morphology, Waves(Water), Sedimentation, Open channel flow.

Two series of studies of sediment transport were run in a recirculating flume 8 ft wide and 200 ft long at constant flow depths of 1.0 ft, 2.0 ft, and 2.8 ft with a fine sand, median diameter of 0.25 mm, and a coarse sand, median diameter of 1.1 mm. Transport rates are closely related to stream power, with increasing transport rates associated with shallower depths for a given stream power. Observed concentrations and velocities agree well with those predicted by Engelund's methods. The variability of the transport rates for equilibrium flow conditions, measured by the coefficient of variability of the observed concentrations, is related to bed configuration, to mean velocity, and to particle size. Bed configurations with the coarser sand are appreciably different from those with the finer sand, especially at flows near critical depth, where dune forms exist with in-phase sinusoidal water-surface waves. At higher Froude numbers, the dunes disappear and classical antidunes with in-phase sinusoidal bed waves and water-surface waves appear. (Knapp-USGS)
W75-02671

STOCHASTIC CHARACTERISTICS OF PARTICLE MOVEMENT OVER A DUNE BED,
Colorado State Univ., Fort Collins.
B. K. Lee, and H. E. Jobson.
In: Sediment Transportation; Vol 1 of Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, January 9-12, 1973, Bangkok, Thailand: Asian Institute of Technology, Bangkok, p 627-638, 1973. 3 fig, 8 ref.

Descriptors: *Bed load, *Dunes, *Sand waves, *Sediment transport, *Stochastic processes, Model studies, Statistical models, Mathematical models, Dispersion, Alluvial channels, Erosion, Scour, Channel morphology.

Stochastic models can be used to predict sediment transport rates and the rate of dispersion of sediment particles in an alluvial channel. These models are based on the idea that the movement of sand particles consists of a series of steps separated by rest periods. Therefore, their use requires a knowledge of the probability distributions of the step lengths, the rest periods, and the elevation of particle deposition. The distribution functions for the rest periods and the elevation of particle deposition as well as the correlation coefficient between the rest period and the elevation of particle deposition can be obtained from a record of the bed elevation at a particular point as a continuous function of time. By restricting the attention to a coarse sand, where the suspended load is negligible, the distribution function for the particle step length and the correlation coefficient between the step length and the elevation of particle deposition can also be obtained from a series of instantaneous longitudinal bed profiles. (Knapp-USGS)
W75-02672

INVESTIGATION OF SEDIMENT TRANSPORT CURVES CONSTRUCTED USING PERIODIC AND APERIODIC SAMPLES,
Geological Survey, Fort Collins, Colo.
J. P. Bennett, and G. V. Sabol.
In: Flood Investigation; Vol 2 of Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, January 9-12, 1973, Bangkok, Thailand: Asian Institute of Technology, Bangkok, p 49-60, 1973. 4 fig, 2 tab, 4 ref.

Descriptors: *Sediment transport, *Statistical methods, *Sampling, Data collections, Statistics, Estimating, Data collections, Sediment load, Bed load, Suspended load.

An investigation of a number of techniques for constructing sediment transport curves using the standard error of estimate and mean error of long-term estimation as objective functions proved the least-squares zero-intercept quadratic to be the best overall type of transport curve. Even using this type of curve, however, reduction of the standard error of estimates much below the standard deviation of the data requires the use of some type of intermittent sediment-sampling program in conjunction with the transport curve. Using the suggested type of transport curve, obtained from data sampled at intervals of 10 days or less from a record of 3 years in length, one can expect mean errors in long-term estimation of less than 20% of the mean daily sediment load for the estimation period, and performance much better than this can be achieved with intermittent sediment sampling techniques. (Knapp-USGS)
W75-02674

TRANSPORT AND DISPERSION OF FLUORESCENT TRACER PARTICLES FOR THE DUNE-BED CONDITION,
Geological Survey, Fort Collins, Colo.
R. E. Rathburn, V. C. Kennedy, and C. F. Nordin.
In: Flood Investigation; Vol 2 of Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, January 9-12, 1973, Bangkok, Thailand: Asian Institute of Technology, Bangkok, p 61-72, 1973. 3 fig, 3 tab, 2 ref.

Descriptors: *Sediment transport, *Bed load, *Tracers, *Dispersion, Fluorescent dye, Alluvial channels, Sands, Sampling, Dunes, Channel morphology.

A fluorescent tracer technique was used to study the transport and dispersion of sand-size particles of various diameters under small transport-rate and dune-bed conditions in the Atrisco Feeder Canal near Bernalillo, New Mexico. Continuous injection of tracers at the centerline of the channel was maintained for 7 days. Samples of the bed material in transport and the accompanying tracers moving along the surface of the dune bed were obtained with a dustpan sampler. The complete spatial distributions of the tracers in the dune bed were determined three times by core sampling. Both the steady-dilution and spatial-integration procedures gave calculated rates of bed-material transport that were in good agreement with rates computed by the modified Einstein procedure. The rate of lateral dispersion of the tracers increased with increase in particle size; the rate of longitudinal dispersion decreased with increase in particle size. (Knapp-USGS)
W75-02675

GENERAL REPORT,
Geological Survey, Fort Collins, Colo.
C. F. Nordin.
In: General Reports, Discussions, Lectures; Vol 4 of the International Association for Hydraulic Research, International Symposium on River Mechanics, January 9-12, 1973, Bangkok, Thailand: Asian Institute of Technology, Bangkok, p 118-136, 1973. 14 ref.

Descriptors: *Sediment transport, *Conferences, *Reviews, *Model studies, Research and development, Mathematical models, Statistical models, Channel morphology, Sedimentation, Sedimentology, Rivers, Estuaries.

Of 10 reviewed studies of sediment transport, six treat sediment transport processes from the point of view of statistics, probability theory, and stochastic processes. Only one presents the results of field investigations, and only two present results of experimental laboratory studies. There may be inbalance between theoretical and experimental studies and field investigations, the results of which remain the only criterion for evaluating the utility of theoretical efforts. A general conclusion is that stochastic models of sediment transport processes are particularly useful to provide insight to the processes, and that in many situations the models have practical applications. Research needs include relating the stochastic measures of flow properties and the boundary properties and integration of the suspended load and bed-load models. During the past decade or so, major advances have been made in the application of stability analysis to predicting the configurations of alluvial channels. The traditional tools of fluid mechanics, such as controlled experiments, dimensional analysis, potential flow and stability analysis, can provide excellent results for problems that are well-posed. The movement of particles as bed load or suspended load, the small scale and large scale configurations generated by the flow, and the documentation and interpretation of field data all are very important and very basic aspects of sediment transport studies. (Knapp-USGS)
W75-02676

COMPUTER SIMULATION OF SOLUTE CONCENTRATIONS AND LOADS IN STREAMS,
Geological Survey, Reston, Va.

For primary bibliographic entry see Field 5B.
W75-02677

DIRECT DETERMINATION OF ZINC IN SEA-BOTTOM SEDIMENTS BY CARBON TUBE ATOMIC ABSORPTION SPECTROMETRY,
Gulf South Research Inst., New Orleans, La. Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 5A.
W75-02749

2K. Chemical Processes

DIRECT TWO-PHASE TITRATION METHOD FOR ANALYZING ANIONIC SURFACTANTS IN FRESH AND SALINE WATERS,
Rensselaer Polytechnic Inst., Troy, N.Y.
For primary bibliographic entry see Field 5A.
W75-02237

EVALUATION OF IMPROVED TWO-PHASE TITRATION METHODS AND A FIELD TEST KIT FOR ANALYZING IONIC SURFACTANTS IN WATER AND WASTEWATER,
Calspan Corp., Buffalo, N.Y. Environmental Systems Dept.
For primary bibliographic entry see Field 5A.
W75-02238

CHEMISTRY OF TASMANIAN INLAND WATERS,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
R. T. Buckney, and P. A. Tyler.
Int Rev Gesamten Hydrobiol, Vol 58, No 1, p 61-78, 1973, Illus.
Identifiers: *Inland waters, Lakes, Precipitation(Atmospheric), River, *Tasmania, *Water chemistry.

A few of Tasmania's several thousand lakes and rivers have been sampled in a preliminary survey of water chemistry. They range in concentration from extremely dilute glacial lakes (TDS (total dissolved solids) < 10 ppm) to hypersaline lagoons (TDS > 85%), the majority being dilute (TDS < 50 ppm). The 3 mechanisms controlling water chemistry proposed by Gibbs operate and the 3 terminal water types showing precipitation-dominance, rock-dominance and solubility-limited composition are found, together with a range of intermediates. The majority of waters have seawater ionic composition or a moderate geochemical modification of this.--Copyright 1974, Biological Abstracts, Inc.
W75-02266

ORGANIC AND INORGANIC GEOCHEMISTRY OF SOME COASTAL PLAIN RIVERS OF THE SOUTHEASTERN UNITED STATES,
Georgia Inst. of Tech., Atlanta. School of Geophysical Sciences.
K. C. Beck, J. H. Reuter, and E. M. Perdue.
Geochim Cosmochim Acta, Vol 38, No 3, p 341-364, 1974, Illus.
Identifiers: Coastal plains, *Geochemistry(Inorganic), Rainfall, Rivers, *Southeast US, *Geochemistry(Organic), *Georgia, *Distribution patterns.

In a comprehensive study of the distribution of organic and inorganic constituents in natural waters, the chemical compositions of several rivers flowing through the Coastal Plain of southeast Georgia (the Satilla River, in particular) were investigated. These streams are generally characterized by low suspended load, low ionic strength, low pH values, and a predominance of organic over inorganic constituents. The dominance of Na and Cl among inorganic ions indicates that rainfall is a major factor in determining the distribution of major elements in these waters. The low pH values and the relatively high concentrations of Fe and Al appear to result from the high concentrations of organic matter. Chemical analysis (total acidity, carboxyl groups, amino acid residues, and CHN analysis) and spectroscopic analysis (i.r. and NMR) indicate that river water organic matter is chemically similar to soil fulvic acids. The dominance of organic matter over inorganic constituents and the resultant low pH values of these waters are in direct contrast with the chemical compositions of most of the rivers of the world which have been previously studied. Many large tributaries draining from the low relief tropical basins of Amazon and other tropical rivers are expected to show similar characteristics; however, none of these has been studied extensively.--Copyright 1974, Biological Abstracts, Inc.
W75-02279

ANALYSIS OF WATERS FOR NITROGEN,
Connecticut Univ., Storrs.
For primary bibliographic entry see Field 5A.
W75-02360

RADIOMETRY OF WATER TURBIDITY MEASUREMENTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W75-02365

LABORATORY EVALUATION OF DISSOLVED OXYGEN ANALYZERS,
Instrumentation Center, Washington, D.C.
For primary bibliographic entry see Field 5A.
W75-02368

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PART 1. NORTH ATLANTIC SLOPE BASINS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-02482

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PARTS 4 AND 5. ST. LAWRENCE RIVER BASIN AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-02483

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-02484

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PARTS 12-16. NORTH PACIFIC SLOPE BASINS, ALASKA, HAWAII, AND OTHER PACIFIC AREAS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-02485

THE QUALITY OF SURFACE WATERS IN TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 5B.
W75-02488

USE OF THE NONPOLAR ANALOG MODEL IN INFERRING THE EXTENT OF ORDERING AROUND SOLUTE MOLECULES IN WATER,
Oklahoma Univ., Norman.
For primary bibliographic entry see Field 1B.
W75-02508

THE MAIN CHEMICAL AND PHYSICAL CHARACTERISTICS OF THE WATERS OF THE UPPER PARANA AND LOWER PARAGUAY RIVERS, (IN SPANISH),
Instituto Nacional de Limnologia, Santo Tome (Argentina).
R. E. Maglianesi.
Physis Secc B Aguas Cont Org, 32(85): 185-197, 1973, Illus, English summary.

Descriptors: *Rivers, Argentina, Turbidity, Silica, Chemical properties, Physical properties.
Identifiers: Paraguay River, Parana River.

Though the Upper Parana and the Lower Paraguay rivers in Argentina have a similar mean turbidity, the former shows greater variability and greater erosion capacity, but a lower mean value of color (84.2) than the Paraguay (125.8). The water color of the Parana is closely related to the turbidity variations, while in the Paraguay it depends on the oxidizability variations. This variable is 3.7 times greater in the Paraguay than in the Parana. The N.NO3 concentrations of both basins are similar to the mean value for the rivers of the world: 226 microgramN.NO3/l. The N.NO3:N.NH3N.NO2 relation in the Upper Parana is 35:21:1 and in the Lower Paraguay 28:20:1. The amount of reactive silica is similar in range and average values (21 mg SiO2/l) in both rivers, while Fe and PO4 are higher in the Lower Paraguay.--Copyright 1974, Biological Abstracts, Inc.
W75-02518

TUBIFICIDS ALTER PROFILES OF REDOX POTENTIAL AND PH IN PROFUNDAL LAKE SEDIMENT,
Maine Univ., Orono. Dept. of Botany and Plant Pathology.
For primary bibliographic entry see Field 2H.
W75-02526

CARBON DIOXIDE CONTENT AND METABOLIC ACTIVITY OF MICROORGANISMS IN SOME ACID LAKES IN JAPAN,
Tokyo Univ. (Japan). Ocean Research Inst.
For primary bibliographic entry see Field 2H.
W75-02527

HYDRODYNAMIC DISPERSION IN UNSATURATED POROUS MEDIA: I. CONCENTRATION DISTRIBUTION DURING DISPERSION,
Jawaharlal Nehru Agricultural Univ., Jabalpur (India).
R. K. Gupta, F. J. Millington, and A. Klute.
J Indian Soc Soil Sci. Vol 2, No 1, p 1-7. 1973. Illus.

Descriptors: *Porous media.
Identifiers: Chloride ion.

Measurement of chloride ion concentration, using a silver-silver chloride electrode system in situ, were made during hydrodynamic dispersion in an unsaturated porous medium. The seepage velocity and solution content of the medium were varied independently. Steady state 1-dimensional bulk solution flow, driven only by gravity, was established in a tilted porous bed, which should result in uniform solution content in the bed. The patterns of data obtained were consistent with effects reflecting the presence of stagnant liquid zones.--Copyright 1974, Biological Abstracts, Inc.
W75-02529

LYSIMETER INVESTIGATIONS ON NITROGEN LEACHING ON MANURING WITH STRAW AND APPLICATION OF VARIOUS FORMS OF N, (IN GERMAN),
Badische Anilin- und Soda-Fabrik A.G., Ludwigshafen am Rhein (West Germany). Landwirtschaftliche Versuchsstation.
For primary bibliographic entry see Field 2G.
W75-02544

WATER-SALT REGIME OF SOILS IN THE CASE OF LIMAN IRRIGATION IN THE COASTAL BELT OF THE GURYEV OBLAST, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Pochvovedeniya.
For primary bibliographic entry see Field 2G.
W75-02549

AN AUTOMATED METHOD FOR THE DETERMINATION OF ARSENIC AND ANTIMONY,
New Brunswick Univ., Frederiction. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W75-02587

THE REDOX PROPERTIES AND THE DETERMINATION OF THE NORMAL POTENTIAL OF THE PEAT-WATER SYSTEM,
Magyar Tudomanyos Akademia Atommag Kutato Intezete, Debrecen.
M. Szilagyi.
Soil Sci. Vol 115, No 6, p 434-437. 1973 Illus.

Descriptors: *Oxidation-reduction potential, *Peat, Humic acid.

The redox normal potential (E0) of a peat-water system was determined through an indirect, experimental method. The peat-water system can be regarded as a reversible redox one. Consequently, it can exert a reducing or oxidizing effect on metal ions. The reducing property plays a role in the geochemical enrichment of metals that migrate in anionic form under natural conditions and, as a result of reduction, turn into cations. Therefore, metal enrichment in humic acids can be interpreted as a cation-exchange process.--Copyright 1974, Biological Abstracts, Inc.
W75-02652

DIFFICULTIES IN THE DETERMINATION OF ARSENIC BY ATOMIC ABSORPTION SPECTROMETRY,
Louisiana State Univ., Baton Rouge. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-02737

A NEW PROCEDURE FOR DETERMINING THE METAL CONTENT OF COLOURLESS COMPLEXONATES,
Leeds Univ. (England). Dept. of Inorganic and Structural Chemistry.
For primary bibliographic entry see Field 5A.
W75-02744

DIRECT DETERMINATION OF ZINC IN SEA-BOTTOM SEDIMENTS BY CARBON TUBE ATOMIC ABSORPTION SPECTROMETRY,
Gulf South Research Inst., New Orleans, La. Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 5A.
W75-02749

EXTRACTION AND ATOMIC-ABSORPTION SPECTROMETRIC DETERMINATION OF TRACE COPPER WITH ZINC DIBENZYLDITHIOCARBAMATE,
Yamaguchi Univ. (Japan). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-02750

2L. Estuaries

STRUCTURE AND FUNCTIONING OF ESTUARINE ECOSYSTEMS EXPOSED TO TREATED SEWAGE WASTES, III. 1971-1972,
North Carolina Univ., Morehead City. Inst. of Marine Sciences.
For primary bibliographic entry see Field 5C.
W75-02254

CONTROL OF BOD UPSETS IN THE DELAWARE ESTUARY,
Delaware Univ., Newark. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W75-02347

NUTRIENTS AND EUTROPHICATION IN THE PAMLICO RIVER ESTUARY, N.C. 1971-1973,
North Carolina State Univ., Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-02353

TEMPORAL VARIABILITY OF SUSPENDED MATTER IN ASTORIA CANYON,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 2J.
W75-02377

TWO-LAYER EXCHANGE IN AN ESTUARY BASIN, WITH SPECIAL REFERENCE TO THE BALTIC SEA,
Washington Univ., Seattle. Dept. of Oceanography.
P. Welander.
Journal of Physical Oceanography, Vol 4, No 4, p 542-556, 1974. 17 fig, 1 tab, 8 ref. NSF Grant GA-30745.

Descriptors: *Estuaries, *Density stratification, *Mixing, *Saline water-freshwater interfaces, Salinity, Analysis, Model studies, Stability, Laboratory tests, Freshwater, Inflow, Statistical methods.
Identifiers: *Two-layer model, *Steady state, Baltic Sea, Exchange, Barotropic transport, Forcing functions.

Stationary and transient states of a two-layer fjord-type estuary were discussed analytically. The forcing functions were the ocean salinity, the fresh-water supply, and a meteorologically forced barotropic transport. Forced nonlinear, time-dependent cases were studied numerically. Some associated laboratory experiments were described. The main results obtained were: (1) A single steady state exists, and is approached in an exponential-like way, (2) the total mixing through the interface must vary with depth (decrease for increasing interface depth) to allow a stable steady state, (3) the static stability increases with increasing fresh-water supply up to a critical value at which the two-layer model breaks down, (4) an added oscillatory component in ocean salinity increases and in fresh-waters supply decreases the estuary salinity and the static stability. The effect of an oscillatory barotropic transport may go in either direction, and (5) the statistical steady state is sensitive to certain high-order statistical features of the forcing functions. It was suggested that changes in such statistical features, rather than changes in mean forcing conditions, may explain observed physical-chemical secular variations in the Baltic, such as the drop of oxygen concentrations of the deep water observed in the last 60 years. (Adams-ISWS)
W75-02384

DYNAMICS OF SMALL-SCALE OCEANIC FRONTS,
Connecticut Univ., Groton. Marine Sciences Inst.; and Connecticut Univ., Storrs. Dept. of Mechanical Engineering.
R. W. Garvine.
Journal of Physical Oceanography, Vol 4, No 4, p 557-569, October 1974. 9 fig, 1 tab, 22 ref. NSF Grant GX-33502.

Descriptors: *Dynamics, *Ocean circulation, *Steady flow, *Coasts, *Sea water, Mathematical models, Sinks, Entrainment, Turbulence, Air-water interfaces, Dispersion, Estuaries, Hydraulics.
Identifiers: *Oceanic fronts, *River plumes, *Richardson number, Connecticut river plume.

An integral model of the steady-state dynamics of a shallow, small-scale oceanic front was developed. Such fronts have been observed at the boundaries of river plumes discharging into coastal sea water. They share with larger scale oceanic fronts the features of persistence in time, despite sharp horizontal gradients in properties, and strong horizontal convergence at the surface front with consequent sinking. For a steady state to exist in a reference frame moving with the front, the model showed that interfacial friction and/or upward mass entrainment was required to balance the net pressure gradient produced by the sloping sea surface and frontal interface in the light water pool. Maintenance of this balance dictated that the Richardson number be of order unity; thus, friction and entrainment coefficients were kept low allowing sharp property gradients in the steady state. Strong surface convergence is also a prominent feature of the model dynamics. Comparisons were made with the observations of Garvine and Monk and showed acceptable qualitative agreement. (Bhowmik-ISWS)
W75-02385

NON-LINEAR WAVES IN THE NEARSHORE REGION: SHOALING AND SET-UP,
Institute of Oceanographic Sciences, Birkenhead (England).
I. D. James.
Estuarine and Coastal Marine Science, Vol 2, No 3, p 207-234, 1974. 10 fig, 2 tab, 44 ref.

Descriptors: *Ocean waves, *Shoals, *Beaches, *Shores, *Slopes, Stokes law, Surf, Deep water, Currents(Water), Momentum equation, Energy equation, Model studies, Hydraulics.
Identifiers: Set-up, Hyperbolic waves, Cnoidal waves, Airy wave theory.

A theory was presented describing the nearshore effects of ocean waves. This theory utilized a combination of third order hyperbolic waves (an approximation of cnoidal waves) near the shore and Stokes waves further out. It was shown that the various theories to determine nearshore effects of ocean waves utilizing linearized, small amplitude wave theory, gave results in general agreement with observation, however they were not strictly applicable in this specific region. The proposed theory was shown to be applicable for the case of spilling breakers on gentle slopes. The momentum and energy fluxes given by the proposed model were calculated and the consequences for wave shoaling and set-up were discussed. (Bhowmik-ISWS)
W75-02386

STUDY OF FINE MATERIAL IN SUSPENSION IN THE ESTUARY OF THE LOIRE AND ITS DYNAMIC GRADING,
Institut Scientifique et Technique des Peches Maritimes, Nantes (France). Laboratoire de Geologie Marine.
B. Gallenne.
Estuarine and Coastal Marine Science, Vol 2, No 3, p 261-272, 1974. 8 fig, 20 ref.

Descriptors: *Sedimentation, *Sediment sorting, *Marine geology, *Mud-water interfaces, Clays, Estuaries, Estuarine environment, Tidal effects, Turbidity, Mud, Suspended solids.
Identifiers: France(Loire estuary).

The tidal and seasonal movements of the turbidity maximum and the fluid mud layer of the Loire estuary were investigated and related to the concentrations of different clay minerals. The concen-

trations of Illite and Montmorillonite were shown to be inversely related, while Montmorillonite reaches a maximum concentration, approximately 40% of clay minerals present, in the zone between the turbidity maximum and the fluid mud. Seasonal variations showed that the concentration of Montmorillonite moves with the turbidity maximum. (Gibb-ISWS)
W75-02387

THE SALT BALANCE IN STRATIFIED ESTUARIES,
Institute of Oceanographic Sciences, Taunton (England).
K. R. Dyer.
Estuarine and Coastal Marine Science, Vol 2, No 3, p 273-281, 1974. 4 tab, 13 ref.

Descriptors: *Estuaries, *Stratification, *Salt balance, *Dispersion, *Diffusion, Circulation, Coriolis force, Homogeneity, Froude number, Hydraulics, Saline water.
Identifiers: *Veller estuary, Southampton water, Mersey narrows, Fickian equation.

Described were the results obtained on salt dispersion in estuaries where several available methods were used. These methods utilized both cross-sectional and time averaging techniques. Data from three estuaries were utilized to compare the results obtained from the various methods. It was shown that the proportion of the salt balance effected by the lateral circulation was greater in partially mixed than in salt-wedge estuaries. This was thought to be consistent with the greater observed effect of centrifugal and Coriolis force in producing lateral inhomogeneity. However, with decreasing stratification and the development of a vertical homogeneous estuary, lateral effects should predominate. Data analysed from two partially mixed estuaries indicated that the lateral contribution was of the same order of magnitude as the vertical. (Bhowmik-ISWS)
W75-02388

LIGHT TRANSMISSIVITY, SUSPENDED SEDIMENTS AND THE LEGAL DEFINITION OF TURBIDITY,
University of South Florida, St. Petersburg. Marine Science Inst.
For primary bibliographic entry see Field 5A.
W75-02389

A NON-LINEAR THEORY OF LONGSHORE CURRENTS,
Institute of Oceanographic Sciences, Birkenhead (England).
I. D. James.
Estuarine and Coastal Marine Science, Vol 2, No 3, p 235-249, 1974. 10 fig, 2 tab, 23 ref.

Descriptors: *Currents(Water), *Shores, *Littoral, Analysis, Beaches, Model studies, Turbulence, Velocity, Surf, Equations, Numerical analysis, Momentum transfer, Boundaries(Surfaces), Mixing, Hydraulics.
Identifiers: *Non-linear wave theory, *Longshore currents, Bottom friction.

A recent model of waves in the nearshore region was used to derive equations for wave characteristics including longshore currents. These equations hold, even for non-linear waves, and include the possibility of interaction between the waves and the longshore current. The equations were solved numerically and the results were compared with experimental data and solutions of linear wave equations. The non-linear theory gave results that were in good agreement with experimental longshore current profiles, although the numerical results depended on somewhat uncertain assumed bottom friction and lateral mixing parameters. The non-linear results depend on a parameter, P, equal to the wave period times the square root of gravity divided by the mean depth at the breaker line. Though this parameter is not included in the linear theory, for a wide range of typical values of P, the two theories give longshore currents of the same order of magnitude. (Adams-ISWS)
W75-02390

SEASONAL AND DIURNAL VARIATION IN SALINITY AND WATER MOVEMENTS IN JAFFNA LAGOON, CEYLON,
Ceylon Univ., Colombo. Dept. of Zoology.
K. D. Arulpragasam.
Estuarine and Coastal Marine Science, Vol 2, No 3, p 251-259, 1974. 3 fig, 2 tab, 14 ref.

Descriptors: *Estuaries, *Estuarine environment, *Saline water-freshwater interfaces, Tidal effects, Bays, Monsoons, Saline water intrusion, Diurnal, Tides, Salinity, Distribution patterns, Mixing, Seasonal, Temperature, Rainfall.
Identifiers: *Ceylon(Jaffna Lagoon-Palk Bay).

The seasonal and diurnal variation in salinity and the seasonal variation in temperature and rainfall were described and discussed for a shallow lagoon on the west coast of North Ceylon. The lagoon has four sea mouths and the pattern of water flow was described and discussed in relation to monsoon winds. The overall pattern of salinity distribution in the lagoon was described. (Gibb-ISWS)
W75-02391

BIBLIOGRAPHY OF THE NEW YORK BIGHT, PART 1 - LIST OF CITATIONS.
National Oceanic and Atmospheric Administration, Rockville, Md. Office of Coastal Zone Management.
For primary bibliographic entry see Field 10C.
W75-02393

BIBLIOGRAPHY OF THE NEW YORK BIGHT, PART 2 - INDEXES.
National Oceanic and Atmospheric Administration, Rockville, Md. Office of Coastal Zone Management.
For primary bibliographic entry see Field 10C.
W75-02394

FRESHWATER INPUT TO COASTAL WATERS OFF THE PACIFIC NORTHWEST,
National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Oceanographic Labs.
For primary bibliographic entry see Field 2E.
W75-02497

INVENTORY OF MAJOR ESTUARINE SYSTEMS IN NEW JERSEY,
New Jersey Dept. of Environmental Protection, Trenton. Div. of Fish, Game and Shellfish.
For primary bibliographic entry see Field 6B.
W75-02498

CHANGES IN THE BRANCHIA OF THE OYSTERS OF THE SADO AND TAJO ESTUARIES (1971 AND 1972), (IN PORTUGUESE),
Instituto de Biologia Maritima, Lisbon (Portugal).
A. A. Dias, and M. D. Serrano.
Boll Inf Inst Biol Marit. 10. p 1-11. 1973. Illus.

Descriptors: *Oysters, Fish diseases.
Identifiers: Crassostrea angulata.

Portuguese oysters, Crassostrea angulata, as well as oysters in France and elsewhere in Europe, have recently been found suffering from 'branchial diseases,' a condition not discovered until 1967/8. Though some French investigators suspected a causal relation of this disease to a fungus, Dermocystidium or Labyrinthomyxa marina, this relationship has never been proved. Though there was some regression of this disease in Portuguese oysters from 1971 to 1972, the condition tends to increase with the oyster's weight, and it has become a problem in oysters, both in the Tejo and Sado estuaries. Perforations of the branchia are a prominent sign, as are 'undulations and indentations.'--Copyright 1974, Biological Abstracts, Inc.
W75-02525

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS: DELAWARE RIVER ESTUARINE MARSH SURVEY.
Academy of Natural Sciences of Philadelphia, Pa., and Delaware Univ., Newark.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-229 781, $7.00 in paper copy, $2.25 in microfiche. Report No NSF/RA/E-73-013, December 1973. 46 fig. GI-33369.

Descriptors: *Marshes, *Land management, Marsh plants, Marsh management, Environmental effects, Delaware, Conservation, Environmental effects, Delaware, Conservation, Environmental engineering, Estuaries, Vegetation, New Jersey, Pennsylvania.
Identifiers: Delaware estuary.

A series of studies attempting to delineate important marshlands in the Delaware estuary, to describe each in terms of its vegetation and aquatic communities, and to identify the impact of human activity on each is presented. Each of three participating institutions, Rutgers University, University of Delaware and the Academy of Natural Science of Philadelphia, assisted in mapping wetland vegetation and collecting secondary data. Conventional mapping techniques using black and white photography, 1970 color infrared photography and extensive field reconnaissance were employed. For each of 46 sites identified a brief description is given, emergent vegetation and aquatic organisms present are identified, impacts are noted and a map of the site and of human activities presented. Results indicate that the upper portion of the estuary is dominated by emergent vegetation characteristics of freshwater marshland. As one proceeds down the estuary, species of salt marshes increase in number. Examination of upper estuary aquatic life indicates organic enrichment, traces of toxic pollution and/or periods of very low dissolved oxygen concentrations. On the seaward side of the Delaware City-Salem area, aquatic fauna and flora were moderately to highly diverse approaching more natural conditions. (Schroeder-Wisconsin)
W75-02621

GENERAL REPORT,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W75-02676

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

POLLUTION TROUBLE SHOOTING THEIR JOB,
For primary bibliographic entry see Field 5D.
W75-02202

REVERSE OSMOSIS MEMBRANES CAST FROM A CELLULOSE ACETATE-METHANOL-DIOXAN DOPE,
Atomic Energy Research Establishment, Harwell (England).
D. Warren.
Available from the National Technical Information Service, Springfield, Va. 22161, as AERE M

2519, $4.00 in paper copy, $2.25 in microfiche. Atomic Energy Research Establishment Report M 2519, January 1974. 21 p, 6 fig, 5 tab, 8 ref.

Descriptors: *Reverse osmosis, *Osmosis, *Membranes, Formulation, *Semipermeable membranes, Solvents, Properties, Temperature, Evaporation, Separation techniques, Treatment, Waste water treatment, Water treatment, *Desalination processes, Cellulose, Curing, Castings.
Identifiers: *Cellulose acetate-methanol-dioxan dope.

The feasibility of preparing satisfactory reverse osmosis membranes from a methanol/dioxan solution was investigated. The results obtained by varying evaporation conditions and curing temperatures were analyzed to determine the optimum conditions for preparing the membranes. Suggestions were offered to account for the poor reproducibility of membrane performance. In order to produce membranes of more precisely reproducible characteristics, it would appear that a greater degree of control should be exercised over the evaporation stage. (Henley-ISWS)
W75-02370

THE PROGRESS OF DESALTING TECHNOLOGY IN KUWAIT,
Kuwait Water Resources Development Centre.
A. M. S. Al Adsani.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 275-308, 8 fig, 7 tab, 15 ref.

Descriptors: *Water resources, *Desalination, *Distillation, Water quality, Reverse osmosis, Electrodialysis, Solar distillation, Planning, Testing, Construction, Operations, Control, Maintenance, Fouling, Scaling, Corrosion, Cisterns, Chemical analysis.
Identifiers: *Middle East, *Kuwait.

The absence of natural surface waters and the limited availability of underground waters of a suitable drinking standard forces Kuwait to rely on desalination of sea water for its drinking water supply. The Ministry of Electricity and Water has built an experienced team of Desalination Engineers and the Ministry's distillation plant specifications are updated to cover all improvements. In view of the tremendous expansion of Water Resources projects in Kuwait, the Ministry of Electricity and Water, in Cooperation with the United Nations, established a Water Resources Development Center in 1968. The Center is concerned in the various water projects undertaken: economic studies of desalinated water cost, computer programs for monitoring the thermal performance of the existing plants, optimum plant size, extraction of minerals and chemicals from desalination brine discharge, and marine fouling control experiments. Operational and reliability data were collected and reported by the Center on pilot reverse osmosis plants and field experience was gained on electrodialysis plants. Theoretical studies on the suitability of solar distillation to Kuwait were made. The Center has been testing commercial treatments of sea water feed to reduce the incidence of fouling and scaling on heat exchange surfaces of the evaporators. Corrosion control has always been a problem and trials will continue on new materials, protective paints and metal coating, etc. Thin tube operations for corrosion testing, the tapproge system for scale control on big commercial plants, and modifications of one of the existing plants for high temperature operation (acid dosing) are all future projects. (See also W75-02440) (Dawes-ISWS)
W75-02456

3B. Water Yield Improvement

A MODEL FOR A CLIMATOLOGY OF THE POTENTIAL OF ICE-PHASE MODIFICATION OF CONVECTIVE CLOUDS,
Navy Weather Research Facility, Norfolk, Va.
W. A. Peterman.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-778 607, $3.75 in paper copy, $2.25 in microfiche. Technical Paper No 8-67, September 1967. 26 p, 3 fig, 12 ref.

Descriptors: *Cloud seeding, *Numerical analysis, *Computer models, Precipitation(Atmospheric), Climatology, Cloud physics, Weather modification, Nucleation, Model studies, Convection.

The theory of the convective model (an extension of the one developed by Davis and Weinstein, 1966) was discussed. Examples were presented of the climatologies that are produced. The limitations of the model were outlined, and what can be done in the future to develop more advanced climatologies of modification potentials was suggested. (Jones-ISWS)
W75-02363

A NUMERICAL STUDY OF CLEARING WARM FOG BY USING HYGROSCOPIC SEEDING IN CONJUNCTION WITH HELICOPTER DOWNWASH,
Environmental Prediction Research Facility (Navy), Monterey, Calif.
P. M. Tag.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-781 259, $3.25 in paper copy, $2.25 in microfiche. Technical Paper No 7-74, May 1974. 40 p, 13 fig, 1 tab, 10 ref.

Descriptors: *Fog, *Weather modification, *Computer models, Nucleation, Aircraft, Numerical analysis, Model studies, Cloud seeding, On-site investigations, Vortices.
Identifiers: *Hygroscopic nuclei, Downwash, Visibility.

Several techniques for dissipating warm fog were tried in field experimentation. In an attempt to augment helicopter downwash dissipation efforts, hygroscopic seeding was suggested. However, because these two techniques work in very different time frames, the question arises as to whether they can be used together simultaneously. By simulating a helicopter downwash profile, a two-dimensional vorticity model was used to determine seeding material concentrations produced as the result of dispensing material into the downwash. Continuous seeding while hovering, pulse seeding while hovering, and the effect of helicopter movement were examined. These cases were studied in conjunction with results generated from earlier hygroscopic seeding studies. It was determined that, for the purpose of utilizing both techniques simultaneously, it is not possible to effectively combine helicopter downwash and hygroscopic seeding. A helicopter can be used as a reasonable platform from which seeding material can be dispensed. However, before downwash efforts are initiated, sufficient time must be permitted for the hygroscopic mechanism to work. (Jones-ISWS)
W75-02364

YELLOWSTONE FIELD RESEARCH EXPEDITION VIII,
Navy Weather Research Facility, Norfolk, Va.
E. E. Hindman, II.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-778 332, $3.25 in paper copy, $2.25 in microfiche. Technical Paper No 6-68, 1968. 12 p, 4 fig, 1 tab, 11 ref.

Descriptors: *Nucleation, *Crystals, Ice, Cloud seeding, Nozzles, On-site investigations, Methodology.
Identifiers: *Compressed air, Yellowstone National Park.

A series of experiments to determine a methodology for using compressed air to produce ice crystals and the usefulness of the technique was conducted in Yellowstone National Park during January 1968. A pressure differential of at least 1.9 atmospheres must be developed across the outlet nozzle. Also the nozzle must be at least 2 mm in diameter to avoid clogging with ice and the air surrounding the nozzle must be at water saturation in order to produce crystals. The number of crystals produced was less than that predicted by theory. Thus, further development work is needed. (Jones-ISWS)
W75-02366

A HISTORY OF AIR WEATHER SERVICE. WEATHER MODIFICATION 1965-1973,
Air Weather Service, Scott/AFB, Ill.
H. A. Chary.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-781 837, $3.25 in paper copy, $2.25 in microfiche. Technical Report 74-247, June 1974. 25 p, 19 fig, 1 tab, 26 ref.

Descriptors: *Weather modification, *Cloud seeding, *Fog, *Precipitation(Atmospheric), Propane, Silver iodide, Droughts, Aircraft, Hurricanes, Ice fog, Carbon dioxide, Rain, Sodium compounds, Texas, Oregon, Alaska, Washington, California.
Identifiers: Air Weather Service, Dry ice, Phillipines, Germany.

Starting in 1965 with cakes of dry ice suspended from balloons, then testing vented liquid carbon dioxide, vented liquid propane, and silver iodide the Air Weather Service (AWS) gradually developed a ground based cold fog dissipation system. Three such systems, all using vented propane, are now operational. In 1967 AWS undertook airborne dissipation of cold fog by seeding with crushed dry ice. AWS investigations into warm fog dissipation started in 1968 when jet engines were used to clear warm fog temporarily from the Travis AFB runway. Subsequently several tests were run using hygroscopics and helicopter downwash. No operational warm fog dissipation system has evolved from these early works. AWS has tried twice to alleviate the ice fog problem, but both endeavors failed to generate the desired clearings. Precipitation augmentation for drought relief is a twice used AWS capability. AWS has participated in such programs in the Philippines and in Texas. AWS's current operational weather modification capabilities include airborne and ground-based cold fog dissipation and precipitation augmentation. (Jones-ISWS)
W75-02367

ON THE DESIGN OF WARM FOG CLEARING EXPERIMENTS USING HYDGROSCOPIC TREATMENTS,
Navy Weather Research Facility, Norfolk, Va.
C. J. Todd.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-777 978, $3.25 in paper copy, $2.25 in microfiche. Technical Paper No. 20-69, September 1969. 7 p.

Descriptors: *Fog, *Weather modification, Cloud seeding, Nucleation, Meteorology, Experimental models.
Identifiers: *Hygroscopic nuclei, Visibility.

Hygroscopic treatment of warm fog has the potential of producing useful clearings of a few square miles that can last for an hour or more. This will be possible, though, only if the meteorological conditions are suitable and the treatment is appropriate for the fog and the operation. Large, long-lasting

clearings can be expected only in relatively unpolluted fogs that have a slow reformation rate, or when continuous dispensing of the hygroscopic material in the required quantities may be feasible such as by means of ground-based dispensors. Effective treatment will involve dispersing the proper size of hygroscopic particles at the right number-density throughout the volume to be cleared. The wrong size or number-density can produce (1) a decrease of visibility, (2) no significant effect, or (3) clearing at a cost of 10 to 100 times the amount of material actually required. (Jones-ISWS)
W75-02369

PROBLEMATIC CONSIDERATIONS OF AQUATIC WEED CONTROL (ANALYSE DE LA PROBLEMATIQUE DU CONTROLE DE LA VEGETATION AQUATIQUE),
National Inst. of Scientific Research, Quebec.
For primary bibliographic entry see Field 2I.
W75-02578

3C. Use Of Water Of Impaired Quality

INFLUENCE OF THE CONCENTRATION AND VOLUME OF SALINE WATER ON THE FOOD INTAKE OF SHEEP, AND ON THEIR EXCRETION OF SODIUM AND WATER IN URINE AND FAECES,
Commonwealth Scientific and Industrial Research Organization, Deniliquin (Australia). Riverian Lab.
A. D. Wilson, and M. L. Dudzinski.
Australian Journal of Agricultural Research, Vol 24, No 2, p 245-256, 1973. 8 fig, 1 tab, 12 ref.

Descriptors: *Sheep, *Saline water, *Farm wastes, Sodium, Urine, Diet, Salts, Potassium, Sodium chloride, Moisture content, Water pollution sources.
Identifiers: *Excretions, *Feces, Food intake, Salt tolerance.

Merino sheep were given fixed volumes of fresh and saline drinking water. The volumes varied from 0.5 to 6.0 liter per day, and salt content ranged from 1.5 to 2.0% sodium chloride. The intake of food and the excretion of urine and feces were then recorded. Food intakes increased with an increase in either fresh or saline water. When sodium chloride was added to the water the food intake decreased but was restored by an increase in the volume of water given of C. 50% for 1.5% salt, and C. 100% for 2.0% salt. When sheep were given saline water the sodium content of the urine increased, but the sodium content of the feces remained the same. The volume of urine excreted was related to the amount of sodium and potassium to be excreted, but the amount of water excreted in the feces was related to the type of diet and the amount of fecal dry matter excreted. (Russell-East Central)
W75-02271

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT. VOLUME II. WATER QUALITY DETERMINATIONS,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 5C.
W75-02283

SALT TOLERANCE OF CHICKPEA VARIETIES DURING GERMINATION,
Pahlavi Univ., Shiraz (Iran). Dept. of Agronomy.
M. Kheradnam, and S. R. Ghorashy.
Agronomy Journal, Vol 65, No 2, p 329, March-April, 1973. 1 fig, 8 ref.

Descriptors: *Salinity, *Crop response, *Germination, Osmotic pressure, Crop production, Yield equations, *Salt tolerance.
Identifiers: *Chickpeas, *Iran.

Effects of seven salinity levels (0 to 2% NaCl) on germination of Iranian chickpea varieties, 'Isfahan 11,' 'Ardebill 169,' 'Ardebill 174,' and 'Ahar 174' were determined under controlled temperature (30 plus or minus 2 C). Increased salinity reduced the germination of Isfahan 11 significantly more than Ardebill 174 and Ahar 174. Sodium chloride concentrations greater than 0.5% reduced the germination of all varieties significantly. The general trend in germination reduction with increased salinity was the same for each variety. (Skogerboe-Colorado State)
W75-02407

INFLUENCE OF CROPPING SYSTEM ON SALT DISTRIBUTION IN AN IRRIGATED VERTISOL,
Texas A and M Univ., Weslaco. Agricultural Research and Extension Center.
B. W. Hipp, and C. J. Gerard.
Agronomy Journal, Vol 65, No 1, p 97-99, January-February, 1973. 3 fig, 3 tab, 6 ref.

Descriptors: *Salinity, *Leaching, *Cotton, *Grain sorghum, Infiltration rates, Saline water, *Saline soils, Conductivity, Salt tolerance, *Texas, Clays.

The influence of cotton and grain sorghum on salt distribution in a vertisol profile was determined. Electrical conductivity of soil saturated pastes taken from the root zone (0 to 90 cm) after 4 years of sorghum ranged from 2.6 to 4.8 mmhos/cm but after 4 years of cotton ranged from 4 to 7.6 mmhos/cm. Chloride concentrations showed similar trends in that Cl- concentrations were 9 to 12 meg/liter at 0 to 90 cm after sorghum, but were from 18 to 30 meg/liter at the same depth after cotton. The differences in salt concentrations in the soil profile after the two crops were attributed mainly to higher water infiltration rate after sorghum than after cotton. The data indicate that cropping practice can be an important factor in salt accumulation in clay soils and that the crops should be alternated to avoid excessive salt accumulation in the root zone. (Skogerboe-Colorado State)
W75-02408

SIMULATION OF DROUGHT AND ITS EFFECT ON GERMINATION OF FIVE PASTURE SPECIES,
Commonwealth Scientific and Industrial Research Organization, Deniliquin (Australia). Riverina Lab.
M. L. Sharma.
Agronomy Journal, Vol 65, No 6, p 982-987, November-December, 1973. 3 fig, 24 ref.

Descriptors: *Osmotic pressure, *Drought tolerance, *Dry farming, Pastures, Salinity, *Germination, *Simulation analysis, Drought.

While studying the effect of drought on seed germination, water potentials are usually simulated by addition of various osmotic substrates to water. Studies showing the comparative effects of these simulated water potentials of true drought are rather scarce. Drought was simulated by sodium chloride (NaCl), mannitol, and polyethylene glycol (PEG, 20,000 mol wt.). These osmotic drought effects were compared with those of true drought. The rate and total germination of all the species declined with decreasing levels of water potential. The extent of such reduction varied considerably among species and with the type of osmotic medium. On iso-potential basis, the order of osmotic medium with respect to the severity of their effect on germination reduction in all the species was PEG>NaCl>mannitol. It was suspected that both NaCl and mannitol entered the seeds, and also that the toxic effects of NaCl were either equally or dominantly offset by the solute entry effects. (Skogerboe-Colorado State)
W75-02422

EFFECT OF H2SO4 IN HIGH SODIUM IRRIGATION WATER ON THE GROWTH OF PEAS AND BEANS IN CALCAREOUS SOILS,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
J. Ryan, S. Miyamoto, and H. L. Bohn.
Agronomy Journal, Vol 65, No 6, p 999-1000, November-December, 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Salinity, *Alkalinity, Sodium, Water quality, Alkaline soils, Alkaline water, Neutralization, *Beans, *Peas, *Salt tolerance, *Calcareous soils.

Preliminary experiments were conducted to evaluate the addition of H2SO4 to high Na water for the purpose of preventing or reducing plant uptake of Na by increasing the solubility of Ca. The addition of up to 4 meq/liter of H2SO4 to irrigation water containing 1 to 40 meq/liter NaCl had no significant effect on the growth of peas and beans cropped twice in calcareous soils in greenhouse experiments. However, H2SO4 had an adverse effect at NaCl concentrations of 60 to 80 meq/liter. Sodium concentrations greater than 10 meq/liter appeared to decrease the yield of both plants. A leaching fraction of 0.3 plus or minus 0.05 was maintained. The Na content of the irrigation water increased, but no reduction in Na content was observed with the H2SO4 treatment. The Ca content was not affected. The results suggest that this practice was ineffective at the H2SO4 concentration range studied. (Skogerboe-Colorado State)
W75-02423

THE PROGRESS OF DESALTING TECHNOLOGY IN KUWAIT,
Kuwait Water Resources Development Centre.
For primary bibliographic entry see Field 3A.
W75-02456

NITROGEN MOVEMENT RESULTING FROM SURFACE APPLICATION OF LIQUID SEWAGE SLUDGE,
Georgia Agricultural Experimental Station, Athens.
For primary bibliographic entry see Field 5B.
W75-02701

3D. Conservation In Domestic and Municipal Use

URBAN WATER USE IN AUSTRALIA,
Gutteridge, Haskins and Davey Pty Ltd., Melbourne (Australia).
C. R. Weeks, and T. A. McMahon.
Civil Engineering Transactions, Institution of Engineers, Australia, Vol CE16, No 1, p 58-66, 1974. 6 fig, 10 tab, 41 ref, 1 append.

Descriptors: *Water users, *Australia, Water supply, Water consumption, Domestic water, Industrial water, Cities, Climates, Urban areas, *Water demand.
Identifiers: *Metered Water.

Results of a survey of urban water use in Australia were presented. In Part I, factors influencing annual water use were examined; these included population size, metering, water quality, and climate. Using trend extrapolation, water demands in 1985 were predicted for eleven Australian cities. Monthly consumption was related to climatic variables through multivariate analysis. In Part II, results from five small study areas in Melbourne, Geelong, and Yallourn were used to detail characteristics of household and garden water usage. Characteristics of Melbourne industrial water use were discussed in Part III. Water use per unit of production for 29 processes was tabulated. (Roberts-ISWS)
W75-02381

RETURN IRRIGATION WATER IN HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W75-02710

3E. Conservation In Industry

WATER TREATMENT: HOW TO TOP EVEN GOVERNMENT STANDARDS,
Holley, Kenney, Schott, Inc., Pittsburgh, Pa.
For primary bibliographic entry see Field 5D.
W75-02204

CONTROL OF COLIFORM IN A SULPHITE MILL AERATED STABILIZATION BASIN,
Crown Zellerbach Corp., Camas, Wash. Microbiological Research.
For primary bibliographic entry see Field 5D.
W75-02206

PICKLING PROCESS POLLUTION PROBLEM 'ELIMINATED'.
For primary bibliographic entry see Field 5D.
W75-02212

URBAN WATER USE IN AUSTRALIA,
Gutteridge, Haskins and Davey Pty Ltd., Melbourne (Australia).
For primary bibliographic entry see Field 3D.
W75-02381

HOW TO MINIMIZE POLLUTION FROM METAL PREFINISHING LINES,
Amchem Products, Inc., Ambler, Pa. Hydro-Fax Div.
For primary bibliographic entry see Field 5D.
W75-02738

3F. Conservation In Agriculture

THE LAND CAN BE RETURNED.
For primary bibliographic entry see Field 5D.
W75-02210

SOIL TEMPERATURE, SOIL MOISTURE AND MAIZE YIELD FROM MULCHED AND UNMULCHED TROPICAL SOILS,
International Inst. of Tropical Agriculture, Ibadan (Nigeria).
R. Lal.
Plant Soil. Vol 40, No 1, p 129-143. 1974 Illus.
Identifiers: Growth rates, *Mulching, *Soil moisture, *Soil temperature, *Tropical soils, *Corn(Field), Crop production.

The effect of mulching on maize yield was investigated for luvisol and cambisol tropical soils during 1970-72. The increase in grain yield by mulching was 46, 52 and 22% respectively, for 1970, 1971 and 1972. Mulched plants had higher growth rate and vigor and chlorotic symptoms of nutritional disorders were observed only for unmulched plants. Mulching significantly decreased the maximum soil temperature measured at 5, 10 and 20 cm depths. In the initial stages of crop growth, temperature differences of as much as 8C were observed between mulched and unmulched plots at a 5-cm depth. Mulched plots also had a higher soil moisture content. Increase in grain yield by mulching was attributed primarily to a decrease in soil temperature and partly to improved soil moisture regime.--Copyright 1974, Biological Abstracts, Inc.
W75-02227

ROOT DEVELOPMENT AND GROWTH RESPONSE OF CORN FOLLOWING MULCHING, CULTIVATION, OR INTERROW COMPACTION,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Soils.
M. R. Chaudhary, and S. S. Prihar.
Agron J. Vol 66, No 3, p 350-355. 1974 Illus.
Identifiers: *Corn(Field), *Cultivation, Growth rates, Moisture, *Mulching, *Roots, Row, Soils, Temperature, *Crop production.

Field studies were conducted to determine the effect of interrow management on root growth and rooting pattern in corn (Zea mays L.) and to relate these changes in soil environment. Four cultural treatments, control, 5-cm deep postplanting cultivation, 2-cm thick straw mulch, and interrow compaction, were established on sandy loam and loamy sand soils during 1970 and 1971. Straw mulch and cultivation enhanced root growth in the upper 15 cm of soil and increased the lateral spread of roots both years. The mulch treatment had less roots than the control below 15 cm. The cultivated plants had more symmetric root distribution. Interrow compaction inhibited lateral spread of roots in the surface layers and caused downward growth of roots. At the 5-cm depth straw mulch reduced the maximum soil temperature by 2.6C in 1970 and 2.3 - 6.3C in 1971. Greater lateral spread and enhanced root growth in the surface layers of mulched plots were associated with reduction of soil temperature and reduction of moisture losses and resulted in better plant growth and higher yield.--Copyright 1974, Biological Abstracts, Inc.
W75-02229

EFFECT OF EXCESSIVE SOIL MOISTURE CONTENT ON THE RATE OF GROWTH PROCESSES OF THE MAIN AND LATERAL SHOOTS OF BARLEY, (IN RUSSIAN),
Komsomolskii-na-Amure Gosudarstvennyi Pedagogicheskii Institut (USSR). Dept. of Biology.
G. A. Vorobeikov.
Biol Nauki. Vol 16, No 12, p 77-80. 1973.
Identifiers: *Barley shoots, *Growth rates, *Soil moisture, Crop response, Crop production.

Under excessive soil moisture conditions (120% of total moisture capacity) the rate of growth processes of all shoots decreased, especially in the tiller shoots, especially in those in which at the given time the growth processes should have occurred with maximum intensity. A correlation was noted between slowing of the growth rate and drop of the water content in the shoots. Severe dehydration of the tiller shoots adversely affected their growth rate. The main shoot is the most resistant part of the plant to unfavorable environmental conditions.--Copyright 1974, Biological Abstracts, Inc.
W75-02236

PREDICTION OF SPRING WHEAT YIELDS FROM TEMPERATURE AND PRECIPITATION DATA,
Clemson Univ., S.C. Dept. of Horticulture.
J. R. Haun.
Agron J. Vol 66, No 3, p 405-509. 1974 Illus.
Identifiers: *Crop production, Equations, Growth rates, *Precipitation data, *Prediction, Production, Soil moisture, *Temperature data, Triticum-aestivum, *Wheat(Spring).

Daily plant growth rate can be used to establish specific, numerical, growth-environment relationships; these relationships may be used in the prediction of yields. Design of a prediction system was based on the hypothesis that plant growth rate, as reflected in cumulative growth during the formative portion of plant development, is correlated with yield. To insure accessibility of sufficient data, environmental variables were limited to temperature and precipitation because these are generally the only variables published for long periods of time over broad geographical areas. Estimated soil moisture was calculated by the Thornthwaite-Mather method. Significant lags were found in plant response to environmental variables. Lengths of lag periods also changed during the season. Thus, 2 prediction equations were used to accommodate these changes and they were applied to the temperature and precipitation records. Resulting cumulative growth values and data representing pre-season moisture conditions were used as independent variables on which yield was regressed to provide a prediction equation for yield. The system, involving 2 equation for growth prediction and one equation for yield, was tested on unrelated (data not used in the formulation of equations) weather and yield data for major spring wheat (Triticum aestivum L. em. Thell.) production areas in Canada and the USSR. The close agreement of predicted yields with actual recorded yields indicated that the use of the system is a promising approach for predicting yields and evaluating the influence of temperature and precipitation on yields.--Copyright 1974, Biological Abstracts, Inc.
W75-02255

RESISTANCE OF WINTER WHEAT AND RYE TO MOISTURE EXCESS IN THE PERIOD OF SEED GERMINATION, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Institut Fiziologii Rastenii i Agrokhimii.
P. A. Vlasyuk, E. K. Beltskaya, and E. G. Bakanova.
Fiziol Biochim Kul't Rast, Vol 5, No 6, p 570-576, 1973, Illus. English summary.
Identifiers: Floods, Growth rates, *Rye, Seed germination, Seedling, Soils, *Wheat(Winter), *Soil moisture.

Peculiarities in resistance of seeds and seedlings to supermoistening and soil flooding were studied. Under these conditions winter rye displayed a greater decrease in germination energy, germination capacity as well as inhibition of the growth processes than winter wheat. When flooded during seeding, the seeds of these crops lose their vitality much earlier than green seedlings and plants at the tillering stage. A method is recommended to estimate different varieties of wheat and rye at the 1st stages of their growth and development for resistance to excess moisture.--Copyright 1974, Biological Abstracts, Inc.
W75-02265

USING POULTRY LITTER, IRRIGATION, AND TALL FESCUE FOR NO-TILL CORN PRODUCTION,
Agricultural Research Service, Athens, Ga.
For primary bibliographic entry see Field 5D.
W75-02317

EFFECT OF IRRIGATION MANAGEMENT ON SOIL-WATER RELATIONSHIPS IN STRATIFIED SOILS,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 2G.
W75-02351

EXPECTATIONS, VARIANCES, AND SENSITIVITY OF NET RETURNS FROM CORN FERTILIZATION EXPERIMENTS,
Missouri Univ., Columbia.
C. Ogut, J. P. Doll, E. M. Kroth, and D. Colyer.
Agronomy Journal, Vol 64, No 4, p 515-518, July-August, 1972. 1 fig, 3 tab, 8 ref.

Descriptors: *Nutrient removal, *Crop response, *Nitrogen, *Corn(Field), Fertility, Fertilization, Crop production, *Missouri, Costs, *Profit.

Experiments measuring corn yield response to applied nitrogen (N) and plant population were conducted at three locations for several years in northern Missouri. Expected profit functions were estimated for each experiment and the input amounts that would have maximized profits for

the time period of the experiments were derived. The resulting amounts were 197 kg of N and 45,360 plants/ha for Grundy County, 140 kg of N and 40,488 plants for Saline County, and 135 kg of N and 34,455 plants in Boone County. These amounts were lower than many of the annual optima. Furthermore, expected profits over the experimental periods were relatively insensitive to departures from the annual optima. Additional analyses determined input rates that (i) minimized the cost or (ii) minimized the variance of a fixed expected profit level for the period. (Skogerboe-Colorado State)
W75-02396

EFFECT OF HIGH RATES OF N, P, K FERTILIZER ON CORN (ZEA MAYS L.) GRAIN YIELDS,
Wisconsin Univ., Madison. Dept. of Soil Science.
R. D. Powell, and J. R. Webb.
Agronomy Journal, Vol 64, No 5, p 653-656, September-October, 1972. 3 fig, 4 tab, 13 ref.

Descriptors: *Fertility, Crop response, *Corn(Field), *Nitrogen, *Phosphorus, *Potassium, Nutrient removal, *Crop production, Fertilizers, *Iowa.

Annual applications of high rates of N, P, and K fertilizer to Clarion-Webster Soil Association soils in central and north central Iowa planted to corn produced variable yield results. Incremental rates of N, P, and K fertilizers up to 1,344, 504, and 1,008 kg/ha, respectively, were applied annually for 3 consecutive years. The grain yields were analyzed statistically using analyses of variance and regression techniques. Three regression functions, a second order quadratic, a logarithmic to the base e, and a square root function were used to estimate the response surfaces and compared for goodness of fit. The yields were the dependent variable and the applied fertilizer nutrients were the independent variables. (Skogerboe-Colorado State)
W75-02397

INFLUENCE OF SUBSURFACE BARRIER ON GROWTH, YIELD, NUTRIENT UPTAKE, AND WATER REQUIREMENT OF RICE, (ORYZA SATIVA),
Indian Inst. of Tech., Kharagpur (India). Dept. of Agricultural Engineering.
K. V. P. Rao, S. B. Varade, and H. K. Pande.
Agronomy Journal, Vol 64, No 5, p 578-580, September-October, 1972. 5 tab, 7 ref.

Descriptors: *Barriers, *Rice, *Nutrient removal, Crop response, Leaching, Fertility, Fertilization, *Crop production, Absorption, *Growth rates, Asia.
Identifiers: *Southeast Asia, Subsurface barriers.

Growth of rice under flooded conditions in Southeast Asia results in excessive water and N losses. The effect of subsurface barriers of bitumen and concrete on yields of rice grown with 60, 90, and 120 kg/ha of N was investigated. Yields of rice grown over the subsurface barriers were significantly higher than those grown on the control. The increase in growth and yield of rice was attributed to increased uptake of N, P, and Fe rendered available due to conducive redox potential. Rice produced significantly higher yields with 90 to 120 kg/ha of N than with 60 kg/ha. Subsurface barriers reduced the water requirement drastically and increased water use efficiency. (Skogerboe-Colorado State)
W75-02398

INFLUENCE OF NITROGEN, PHOSPHORUS, AND PLANT POPULATION ON YIELD AND QUALITY OF FORAGE CORN,
Louisiana State Univ., Baton Rouge. Dept. of Agronomy.
D. L. Robinson, and L. S. Murphy.
Agronomy Journal, Vol 64, No 3, p 349-351, May-June, 1972. 4 tab, 14 ref.

Descriptors: *Corn(Field), *Fertility, Crop response, *Nitrogen, *Phosphorus, Nutrient removal, *Crop production, Plant populations, *Kansas, Regression analysis, *Fertilizers.

Irrigated forage corn was grown at five plant populations and five levels each of N and P at five field locations in central Kansas during a 3-year period to determine the influence of each variable on yield and quality of forage produced. An incomplete factorial arrangement of 23 treatments was used in a randomized complete block design. Multiple regression analyses indicated both forage and grain yields were significantly affected by N but not by P or plant population treatments. Treatment variables contributed little to variability in forage quality as measured by in vitro fermentation and forage fiber analyses. Nitrogen, cellulose, and lignin concentrations in the forage contributed up to 84% of the variation in in vitro dry matter digestibility. These results indicate that in central Kansas, irrigated corn yields are primarily a function of the rate of N application, and that a rather wide range of plant populations can be tolerated without significantly affecting yield or quality of forage produced. (Skogerboe-Colorado State)
W75-02399

INCREASE IN CONDUCTIVITY OF IRRIGATION WATER DURING SPRINKLING,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 2D.
W75-02400

NITROGEN NUTRITION AND YIELD RELATIONS OF NUGAINES WINTER WHEAT,
Washington State Univ., Prosser. Cooperative Extension Service.
P. Laopirojana, S. Roberts, and M. D. Dawson.
Agronomy Journal, Vol 64, No 5, p 571-573, September-October, 1972. 1 fig, 2 tab, 12 ref.

Descriptors: *Nutrient removal, Crop response, *Nitrogen, *Wheat, Fertility, Fertilization, *Crop production, *Oregon, Fertilizers.
Identifiers: Winter wheat.

A nitrogen rate study was undertaken to determine the potential utility of the critical nutrient concept as a guide to N fertilization of winter wheat, as part of a more extensive soil fertility investigation in western Oregon. This work on wheat was prompted by the need for a suitable diagnostic technique for determining more precisely the optimum levels of available N. A graph of grain yield vs NO3-N concentration in plant leaves at jointing showed a definite peak in grain yield at approximately 500 ppm NO3-N in the leaves. Additional applied N very readily increased leaf NO3-N considerably above 500 ppm and caused a slight, insignificant drop in grain yield. These results suggest the applicability of the critical nutrient concept to semidwarf wheat, and provide justification for additional work to establish more precisely the critical level for NO3-N in wheat. (Skogerboe-Colorado State)
W75-02401

EFFECT OF ANTITRANSPIRANTS ON YIELD OF GRAIN SORGHUM UNDER LIMITED IRRIGATION,
New Mexico State Univ., Clovis. Plains Branch Agricultural Experiment Station.
For primary bibliographic entry see Field 2D.
W75-02403

A MODEL FOR ESTIMATING DESIRED LEVELS OF NITRATE-N CONCENTRATION IN COTTON PETIOLES,
California Univ., Davis. Dept. of Water Science and Engineering.
D. W. Grimes, W. L. Dickens, H. Yamada, and R. J. Miller.
Agronomy Journal, Vol 65, No 1, p 37-41, January-February, 1973. 5 fig, 3 tab, 14 ref.

Descriptors: *Nitrogen, *Fertilizers, *Cotton, Crop response, Water management(Applied), Water pollution sources, Nitrates, Clay loam, *California, Model studies.
Identifiers: San Joaquin Valley(Calif), *Nitrate-nitrogen.

Field studies were conducted in the San Joaquin Valley, California, on two widely different soils over a three-year period in a semiarid irrigated region to establish functional relations between responses of cotton plants and the major production input factors: water, nitrogen, and plant density. The nitrate-nitrogen concentrations of petioles from the most recently matured leaves were influenced by N-fertilization level, time of sampling in the season, and water management. Plant population did not alter the nitrate-N levels of petioles. High contentrations were associated with large amounts of N applied in side-dress soil applications. On a fine-textured soil with a high water-retention capacity N side-dressed after emergence was not taken up by the plant until the first irrigation was added. Concentrations of nitrate-N in petioles at critical times in the season were characterized by a 2nd-degree polynomial model having water and nitrogen quantities as independent variables. (Skogerboe-Colorado State)
W75-02404

INFLUENCE OF FERTILIZER PLACEMENT ON YIELD RESPONSE OF SOYBEANS,
Minnesota Univ., St. Paul. Dept. of Soil Science.
G. E. Ham, W. W. Nelson, S. D. Evans, and R. D. Frazier.
Agronomy Journal, Vol 65, No 1, p 81-84, January-February, 1973. 2 fig, 3 tab, 11 ref.

Descriptors: *Fertility, *Fertilizers, *Crop response, Nitrogen, *Phosphorus, *Potassium, *Soybeans, Minnesota.

Fertilizer treatments consisting of banded starter, starter in contact with the seed, and a combination of banded and seed placement were superimposed on broadcast fertilizer treatments at three locations. Responses varied depending on environmental factors. With low rainfall and a low soil test P level, the largest response was from broadcast fertilizer. Starter fertilizer had less effect on seed yields either with or without broadcast fertilizer even though both starter and broadcast effects were significant. With adequate rainfall and a low P level, the largest response was to combinations of starter and broadcast fertilizer. Yields were increased by as much as 746, 598, and 941 kg/ha with band, seed placement and broadcast treatments, respectively. When P and K levels were very high, no yield increases were obtained from any fertilizer placement. In fact, seed placement without broadcast or seed placement and/or band in combination with broadcast decreased yields significantly in many cases. (Skogerboe-Colorado State)
W75-02405

QUANTITATIVE SOIL MOISTURE USE IN CORN GROWN UNDER CONVENTIONAL AND NO-TILLAGE METHODS,
National Weather Service, Lexington, Ky.
J. D. Hill, and R. L. Blevins.
Agronomy Journal, Vol 65, No 6, p 945-949, November-December, 1973. 7 fig, 1 tab, 8 ref.

Descriptors: *Soil moisture, *Moisture stress, *Corn(Field), Crop production, Crop response, *Cultivation, Farm management, Mulching, Kentucky, Water utilization.

Experiments conducted at the University of Kentucky during 1969, 1970, and 1971 compared corn production under conventional and no-tillage

systems. The presence of a killed-sod mulch in the no-tillage plots almost eliminated the loss of moisture by direct evaporation from the soil surface during the early growing period, but after a full crop canopy had developed, losses from both production methods were about equal. Water loss from the soil during the full-canopy period was compared with open pan evaporation to determine the rate of loss under varying levels of soil moisture deficiency. The average soil moisture deficiency during the period from about three weeks before to six weeks after silking was related to final grain yield, and a simple linear relationship indicated that each additional cm of water available to the plant increased yields by about 559 kg/ha. (Skogerboe-Colorado State)
W75-02406

DETERMINATION OF TOTAL NITROGEN IN PLANT MATERIAL,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 2I.
W75-02411

NITRATE REDUCTION WITH SUBMERGED DRAINS,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
For primary bibliographic entry see Field 5B.
W75-02412

WATER TABLE MOVEMENT DURING SUBIRRIGATION,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 2G.
W75-02413

EFFECT OF POROUS ROOTZONE MATERIALS UNDERLINED WITH PLASTIC ON THE GROWTH OF CREEPING BENTGRASS (AGROSTIS PALUSTRIS HUDS),
Miller, Wihry and Brooks, Louisville, Ky.
D. S. Ralston, and W. H. Daniel.
Agronomy Journal, Vol 65, No 2, p 229-232, March-April, 1973. 5 fig, 2 tab, 7 ref.

Descriptors: *Soil moisture, *Crop response, *Grasses, Perched water, Plastics, Tension, Pore water porosity, Porous media, Rootzone, Crop production, Indiana.
Identifiers: *Bentgrass.

Creeping bentgrass was studied under putting green conditions when grown on replicated plastic-lined plots containing dune sand, mortar sand, calcined clay, diatomaceous earth, and peat. Soil was not included in any of the rootzone mixtures because of its inherent structural instability. In 1968 and 1969, some infiltration rates exceeded 150 cm/hr and all were greater than 7 cm/hr, therefore, water movement was considered ample. The relative ability of the material in plots to retain moisture was measured by allowing the plots to dry-down for 15 days between rains during August 1968 and for 17 days during July 1969. No irrigation was added to any plot until turf showed severe wilt. Bentgrass on plots containing the finer fractions of the dune sand, diatomaceous earth, various mixtures of sand, calcined aggregates, and peat did not require water for either period. (Skogerboe-Colorado State)
W75-02415

A SYSTEMATIC APPROACH TO SIMULATING CORN PRODUCTION SYSTEMS,
Michigan State Univ., East Lansing. Dept. of Agricultural Engineering.
J. B. Holtman, L. K. Pickett, D. L. Armstrong, and L. J. Connor.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 1, p 19-23, January-February, 1973. 10 fig, 3 tab, 18 ref.

Descriptors: *Computer models, *Crop production, *Simulation analysis, Crop response, Yield equations, *Corn(Field), Model studies.

A study of the role of the producer as decision-maker revealed that certain informational tools were required for fruitful decisions. Three types of information identified as important for the producer's needs were: (a) long run system performance data for determining average expected return, (b) short run system performance data for immediate tactical decisions and (c) risk associated with various alternatives available for the decision. Simulation was found to be a suitable approach for obtaining the information required for the necessary decisions. A flexible approach to simulation model construction was selected as the best way to meet the differing needs of producers and the needs of researchers and extension specialists involved in improving decision-making techniques. Flexibility of application was obtained by systematic construction of component models which can be used in combinations appropriate to the decision problem. Simulation of the harvesting phase of a 200 acre corn farm was provided as one example of combining component models to provide information contributing to a particular decision. (Skogerboe-Colorado State)
W75-02416

CONTROLLING AUTOMATED IRRIGATION WITH SOIL MATRIC POTENTIAL SENSOR,
Agricultural Research Service, Florence, S.C. Coastal Plains Soil and Water Conservation Research Center.
For primary bibliographic entry see Field 2G.
W75-02417

RAINOUT SHELTER AND DRAINAGE LYSIMETERS TO QUANTITATIVELY MEASURE DROUGHT STRESS,
Kansas Agricultural Experiment Station, Manhattan. Evapotranspiration Lab.
For primary bibliographic entry see Field 2D.
W75-02418

SURFACE IRRIGATION UNDERGROUND PIPELINES WITH MOVABLE RISERS,
Academy of Agricultural Sciences, Sofia (Bulgaria). Inst. of Soil Science.
I. Varlev.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 4, p 787-789, July-August, 1973. 7 fig, 3 ref.

Descriptors: *Irrigation practices, *Surface irrigation, Furrow irrigation, Border irrigation, *Pipelines, Water distribution(Applied), Water supply, *Irrigation systems.

Investigations have been successfully completed in the development of surface irrigation systems where the water is distributed by underground lateral pipelines having either removable or movable risers which supply water to either furrows or borders. The pressure used in these pipelines is only 5 to 6 feet of water, which allows the use of more economical low-pressure pipe materials. Full automation of the delivery from lateral-to-lateral can be achieved. These systems have been designed to achieve efficient use of water, while minimizing labor requirements. (Skogerboe-Colorado State)
W75-02419

INTERNAL LEAF WATER STATUS AND TRANSPORT OF WATER IN RICE PLANTS,
Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India). Dept. of Soil Science.
For primary bibliographic entry see Field 2D.
W75-02420

ROOTING DENSITY AND WATER EXTRACTION PATTERNS FOR CORN (ZEA MAYS L.),
Agricultural Research Service, Ames, Iowa.
For primary bibliographic entry see Field 2I.
W75-02421

SUBSURFACE DRAINAGE AND IRRIGATION FOR SUGARCANE,
Agricultural Research Service, Baton Rouge, La.
C. E. Carter, and J. M. Floyd.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 2, p 279-281, 284, March-April, 1973. 6 fig, 7 ref.

Descriptors: *Irrigation practices, *Subsurface irrigation, *Drainage, *Subsurface drainage, Tile drainage, *Soil water movement, Crop response, *Sugarcane, Louisiana.

Water management practices, particularly subsurface drainage, increased annual sugarcane yields from 24 to 62 percent over those from check plots and increased the number of crops grown after a single planting from the normal three to five. No response to irrigation was recorded. Sucrose content of the cane's juice decreased as cane yields increased. Extra cane produced by the treated plots more than compensated for the lower percent sucrose; consequently, sugar yields per acre were higher from the treated plots. (Skogerboe-Colorado State)
W75-02426

AN ECONOMICAL HYDRAULIC WEIGHING EVAPOTRANSPIRATION TANK,
Agricultural Research Service, Morris, Minn.
For primary bibliographic entry see Field 2D.
W75-02427

EVALUATING OUTDOOR WEATHERABILITY OF BUTYL RUBBER SHEETING UNDER STRESS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 4A.
W75-02428

INFLUENCE OF WATER MANAGEMENT THROUGH IRRIGATION AND A SUBSURFACE ASPHALT LAYER ON SEASONAL GROWTH AND NUTRIENT UPTAKE OF CORN,
Florida Univ., Gainesville. Dept. of Soil Science.
W. K. Robertson, L. C. Hammond, G. K. Saxena, and H. W. Lundy.
Agronomy Journal, Vol 65, No 6, p 866-868, November-December, 1973. 3 fig, 3 tab, 8 ref.

Descriptors: *Irrigation, *Drainage, *Deep percolation, *Sands, Fertility, Leaching, Water loss, *Asphalt, *Water management(Applied), *Corn(field), Growth rates, Absorption.

During the past five years improved water management of droughty sandy soils has been attained by constructing, at a depth of 60 cm, a continuous layer of asphalt about 0.3 cm thick. Plots on a Typic Quartzipsamment were treated in 1967 and used in 1970 and 1971 to measure seasonal growth and nutrient uptake of corn in response to the following water management treatments: check, irrigation, asphalt layer, and irrigation with asphalt layer. Responses to fertilizer rate and plant population were also obtained. The asphalt layer increased corn fodder yields above the check and irrigation treatments during the first 11 weeks when moisture stress was moderate. At this time an 11-day drought caused a severe water stress on the check and asphalt layer treatments. The seasonal response of corn to water management showed that the asphalt layer system was effective in increasing water use efficiency in well-drained sandy soils. (Skogerboe-Colorado State)
W75-02430

INFLUENCE OF SOIL WATER STATUS AND METEOROLOGICAL CONDITIONS ON EVAPORATION FROM A CORN CANOPY,
Agricultural Research Service, Temple, Texas. Blackland Conservation Research Center.
For primary bibliographic entry see Field 2D.
W75-02431

RESEARCH CONCEPTS,
W. O'Rourke.
Calf News, Vol 10, No 4, p 16, 48, April, 1972. 1 tab.

Descriptors: *Research, *Cattle, *Feeds, *Water consumption, *Growth rates, Confinement pens, Energy, Economics, Farm wastes, Tennessee.
Identifiers: Water restriction, Roughages, Weight.

Raising calves in a feedlot requires energy restriction. This may be done by (1) Feeding roughages such as hay, straw, and corn, and (2) Feeding a limited amount of an energy-dense feed formulated to supply daily requirements of essential nutrients. Both methods have drawbacks, however. Therefor, three small pens (30 ft by 90 ft) were adapted to study the effect of water restriction on feed consumption. Fifteen 450 pound steer calves were placed in each pen. One pen of calves was fed chopped alfalfa hay, plus a 1:1 mixture of salt and decalcium phosphate. The calves in the remaining two pens were changed to a high-energy finisher ration. One pen of the calves received only a measured amount of water each day. The results showed that cattle health, gain, and feed efficiency after fill were encouraging. Water restriction is a useful way to reduce feed consumption and restrict gain. Feed efficiency in comparison to the hay-fed cattle is marked and with milo presently costing less than medium quantity alfalfa hay, the economy of restricting intake of a high energy ration by water restriction is excellent. (Drewry-East Central)
W75-02436

WHAT TO DO ABOUT POULTRY'S PROTEIN-ENERGY CRISIS,
Georgia Univ., Athens. Dept. of Poultry Science.
For primary bibliographic entry see Field 5G.
W75-02439

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN INDIA,
Ministry of Irrigation and Power, New Delhi (India).
For primary bibliographic entry see Field 2A.
W75-02446

PRESENT STATUS OF WATER RESOURCES DEVELOPMENT IN INDONESIA,
Indonesian Inst. of Sciences, Djakarta.
For primary bibliographic entry see Field 2A.
W75-02447

WATER RESOURCES STATUS REPORT ON PAKISTAN,
For primary bibliographic entry see Field 2A.
W75-02449

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN SRI LANKA,
Mahaweli Development Board (Sri Lanka).
For primary bibliographic entry see Field 2A.
W75-02450

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN THAILAND,
Royal Irrigation Dept., Bangkok (Thailand). Hydrology Div.
For primary bibliographic entry see Field 2A.
W75-02451

WATER RESOURCES AND DEVELOPMENT IN IRAQ,
Scientific Research Council, Baghdad (Iraq).
For primary bibliographic entry see Field 2A.
W75-02453

UTILITY OF A SIMPLE SOIL WATER BUDGET MODEL IN AGRONOMIC RESEARCH: 3. ESTIMATION OF THE POTENTIAL EVAPOTRANSPIRATION FUNCTION,
Sydney Univ., Narrabri (Australia). North West Wheat Research Inst.
For primary bibliographic entry see Field 2D.
W75-02480

PROSPECTS FOR BIOLOGICAL CONTROL OF EURASIAN WATERMILFOIL,
Agricultural Research Service, Gainesville, Fla. Biology Research Lab.
N. R. Spencer, and M. Lekic.
Weed Sci. Vol 22, No 4, p 401-404. 1974.

Descriptors: *Weed control, *Biocontrol.
Identifiers: Myriophyllum spicatum, Watermilfoil.

Eurasian watermilfoil (Myriophyllum spicatum L.) has invaded over 81,000 ha in the Chesapeake Bay, 2023 ha in TVA (Tennessee Valley Authority) reservoirs, and upwards of 32,000 ha in Currituck Sound, North Carolina (all in USA). Now it is causing concern in Florida (USA) because of its invasion of the Crystal-Homosassa River basin. In Yugoslavia and Pakistan, entomologists working on PL-480 grants found some 25 insect species feeding on eurasian watermilfoil. These species are potentially useful for the biological control of the weed in the USA.--Copyright 1974, Biological Abstracts, Inc.
W75-02535

NOTE ON EFFECT OF PRESOWING IRRIGATION ON PRODUCTION OF MEXICAN WHEATS IN CHAMBAL COMMANDED AREA,
Rajasthan Agriculture Dept., Kota (India).
U. B. Singh, S. P. Tomar, and R. S. Rathi.
Ann Arid Zone. Vol 12, No 1/2, p 100-102. 1973.

Descriptors: *Irrigation effects, *Wheat, India.

Experiments with durum wheat in this part of India show that, while presowing irrigation had no effect on normally irrigated crops, it could be helpful (3-6 fold yields) in those areas where no regular irrigation is used.--Copyright 1974, Biological Abstracts, Inc.
W75-02536

INVESTIGATING THE ENVIRONMENTAL IMPACT OF ENGINEERING PROJECTS,
Council for Scientific and Industrial Research, Pretoria (South Africa).
For primary bibliographic entry see Field 8A.
W75-02564

THE EFFECTS OF CULTIVATION TREATMENT ON WATER POTENTIAL AND SOIL AERATION IN WET HEATHLAND WITH SPECIAL REFERENCE TO AFFORESTATION,
Sheffield Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 2I.
W75-02607

REGULATION OF SUPPLIES FROM THE BHAKRA RESERVOIR,
Bhakra Management Board (India).
K. R. Mehndiratta, and R. N. Hoon.
Irrigation and Power, Vol 30, No 4, p 345-356, October 1973. 7 fig, 7 tab.

Descriptors: *Dams, *Reservoir operation, *Water supply, *Reservoir storage, *Water levels, *Irrigation water, Water demand, Direct benefits, Indirect benefits, Rivers, Seasonal, Monsoons, Management, Projects, Reservoir releases, Optimum development plans.
Identifiers: *Northern India, *Power generation, Depletion, India, Bhara Dam.

Although the completion of Bhakra Dam has made power resources available which have helped revolutionize Northern India's economic and industrial structure, the impressive benefits do not suffice the present power needs of the developing society. Originally, the Dam was considered to be primarily an irrigation project, but with the rapid increase of power load in the region, this position has reversed; such reversal must be considered in planning the reservoir releases. Since all the anticipated benefits from the Dam depend upon the wise and efficient use of stored water, the reservoir operation aims toward the optimum use of water for providing irrigation supplies and for the production of power. This paper studies the use of water for these purposes and gives a brief review of the reservoir operation from 1967 through 1972. Results show that during slack irrigation demand periods, power generation tends to deplete the reservoir faster than programmed. It has not been possible to coordinate the releases for irrigation and power satisfactorily so far, resulting in low reservoir levels during May when inflows are very uncertain. The preparation of water power studies at the start of the depletion period is essential to ensure that irrigation and power demands are adequately met. (Bell-Cornell)
W75-02679

SKEWNESS AND KURTOSIS INFLUENCE ON UNIFORMITY COEFFICIENT, AND APPLICATION TO SPRINKLER IRRIGATION DESIGN,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
C. Seniwongse, I-P. Wu, and W. N. Reynolds.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 15, No 2, p 266-271, March-April, 1972. 15 fig, 2 tab, 10 ref.

Descriptors: *Irrigation, *Irrigation practices, *Irrigation methods, *Sprinkler irrigation, Uniformity coefficient.

Frequency analysis indicates that about 70 percent of sprinkler data, that portion of the data where the uniformity coefficients are 70 percent or greater, can be fitted by a gamma distribution. A preliminary study has shown that only a few low-uniformity sprinkler tests fit an exponential distribution. No sprinkler data were found to fit a poisson distribution. Skew and kurtosis can be related to sprinkler uniformity coefficients with values of 70 percent or less. The distribution of low uniformity data is generally positively skewed. (Skogerboe-Colorado State)
W75-02709

RETURN IRRIGATION WATER IN HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W75-02710

HYDRAULICS AND UNIFORMITY FOR DRIP IRRIGATION,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
I-P. Wu, and H. M. Gitlin.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 99, No IR2, p 157-168, June 1973. 7 fig, 7 ref.

Descriptors: *Irrigation, *Irrigation practices, Surface irrigation, Irrigation efficiency, Irrigation systems, Pipe flow, Uniformity coefficient.
Identifiers: *Drip irrigation, Pressure distribution.

A drip irrigation system consists of a main line, submains, and laterals and emitters. The flow con-

dition in the submain and laterals is steady, spatially varied with lateral outflows; the discharge is decreasing with respect to the length of the line. By considering them as smooth pipes, Blasins equation for friction coefficient is used to determine energy drop between outlets along a drip irrigation line. The energy gradient line is not a straight line but a curve of exponential type which can be determined by calculating energy drop of all sections along the line. A simple way of estimating energy gradient line with only about 1% of error is to divide the line into three or four segments and use the average discharge for each segment to calculate energy drops along the line. The pressure distribution along the line can be determined for both level and sloping surfaces. (Skogerboe-Colorado State)
W75-02711

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

RAINFALL-RUNOFF MODELS USING DIGITAL COMPUTERS,
New South Wales Inst. of Technology, Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-02260

EFFECT OF PRESCRIBED BURNING ON SEDIMENT, WATER YIELD, AND WATER QUALITY FROM DOZED JUNIPER LANDS IN CENTRAL TEXAS,
Texas Tech Univ., Lubbock. Dept. of Range and Wildlife Management.
H. A. Wright, F. M. Churchill, and W. C. Stevens.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 036, $3.75 in paper copy, $2.25 in microfiche. Completion Report, November, 1974. 29 p, 6 tab, 5 fig, 50 ref. OWRR C-3191(No 3699)(2).

Descriptors: *Erosion, Sedimentation, Runoff, *Cover, *Water quality, *Water yield, Watersheds(Basins), Slopes, Soils, Nutrients, Turbidity, Water hardness, *Texas, *Juniper trees, Vegetation, Burning, *Brush control, *Sediments, Watershed management.
Identifiers: Ecological impact, Bare areas, *Prescribed burning.

The purpose was to determine how long it takes for erosion, runoff, and water quality in burned, dozed juniper areas to reach preburn levels after treatment. Prescribed burning was applied to six micro-watersheds on limestone-derived soils. Each burned watershed was paired with an unburned watershed, and metal tanks were installed at the base of all watersheds to collect runoff and sediment. Three degrees of slope were studied. Sediment losses stabilized in 9 to 15 months on moderate slopes and in 15 to 18 months on steep slopes, which correlated with a 60 to 70% vegetative cover. Overland flow stabilized in 12 to 18 months on moderate slopes, but was still above the controls on steep slopes 30 months after treatment. Following burning, water was soft from level areas, moderately hard for 6 months on 15 to 20% slopes, and moderately hard for 15 to 30 or more months on 45 to 53% slopes. Turbidity stayed above controls for 1 1/2 years on moderate slopes and for at least 2 1/2 years on steep slopes. Sodium was always low, and pH was raised only slightly after burning moderate and steep watersheds. Slopes greater than 20% should not be converted from shrubs to grass if they are left to heal naturally.
W75-02345

BRUSH CONTROL ALONG AGRICULTURAL DRAINAGE DITCHES: ENVIRONMENTAL SAFETY AND EFFICACY OF HERBICIDE FORMULATIONS,
Purdue Univ., Lafayette, Ind. Dept. of Botany and Plant Pathology.
For primary bibliographic entry see Field 5B.
W75-02349

EVALUATION OF LARGE-SCALE MECHANICAL MANAGEMENT OF AQUATIC PLANTS IN WATERS OF DANE COUNTY, WISCONSIN,
Wisconsin Univ., Madison. Dept. of Mechanical Engineering; and Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-02354

A DYNAMIC MODEL OF STAGE-DISCHARGE RELATIONS AFFECTED BY CHANGING DISCHARGE,
National Weather Service, Silver Spring, Md. Office of Hydrology.
D. L. Fread.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-10818, $4.25 in paper copy, $2.25 in microfiche. NOAA Technical Memorandum NWS HYDRO-16, November 1973. 38 p, 19 fig, 1 tab, 9 ref, 2 append.

Descriptors: *Streamflow forecasting, *Flood discharge, *Stage discharge relations, Streamflow, Forecasting, Flow, Channels, River forecasting, Hydraulics, Roughness(Hydraulic), Flow characteristics, Non-uniform flow, Rating curves, Hydrographs, Computer programs, Mathematical models, Slope.
Identifiers: Dynamic loop discharge hydrograph.

A mathematical model was developed to simulate the dynamic relationship that exists between stage and discharge when the energy slope is variable due to the effects of changing discharge. The model enables either stage or discharge to be computed if the other is specified (measured or predicted) and the channel slope, cross-sectional area, and roughness properties are known. The model was tested on several stage-discharge relations, which are influenced significantly by changing discharge, and was found to provide excellent results. Also presented was a simple and easily-applied graphical procedure to estimate the magnitude of the changing discharge effect on stage-discharge ratings. (Sanderson-ISWS)
W75-02372

SURFACE IRRIGATION UNDERGROUND PIPELINES WITH MOVABLE RISERS,
Academy of Agricultural Sciences, Sofia (Bulgaria). Inst. of Soil Science.
For primary bibliographic entry see Field 3F.
W75-02419

EVALUATING OUTDOOR WEATHERABILITY OF BUTYL RUBBER SHEETING UNDER STRESS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
A. R. Dedrick.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 4, p 769-772, July-August, 1973. 6 fig, 2 tab, 11 ref.

Descriptors: *Rubber, *Membranes, Weathering, *Deterioration, Stress, *Canal linings, Impervious membranes, Waterproofing, *Utah.

Seasonal variation of deterioration and the effect of membrane elongation and thickness on rate of deterioration were determined for one butyl rubber formulation at Logan, Utah. Deterioration rates were greatest during the high temperature part of the year. Deterioration rates increased as elongation increased and as membrane thickness decreased. Short exposure times (a few weeks) can be used to evaluate the potential life of a butyl rubber membrane when thickness, stress (elongation), and season are properly considered. (Skogerboe-Colorado State)
W75-02428

WATER FOR THE HUMAN ENVIRONMENT, VOLUME II, COUNTRY REPORTS.
For primary bibliographic entry see Field 2A.
W75-02440

THE STATUS OF KENYA'S WATER RESOURCES AND THEIR DEVELOPMENT,
Nairobi Univ., Kenya. Dept. of Physical Geography.
For primary bibliographic entry see Field 2A.
W75-02442

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN TANZANIA,
Ministry of Water Development and Power, Dar es Salaam (Tanzania).
For primary bibliographic entry see Field 2A.
W75-02443

WATER RESOURCES DEVELOPMENT IN BANGLADESH,
Bangladesh Flood Control, Irrigation and Power, Dacca.
For primary bibliographic entry see Field 2A.
W75-02444

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN MALAYSIA,
Drainage and Irrigation Dept., Kuala Lumpur (Malaysia).
For primary bibliographic entry see Field 2A.
W75-02448

WATER RESOURCES AND DEVELOPMENT IN IRAQ,
Scientific Research Council, Baghdad (Iraq).
For primary bibliographic entry see Field 2A.
W75-02453

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN TURKEY,
State Hydraulic Works, Ankara (Turkey). Investigation and Planning Dept.
For primary bibliographic entry see Field 2A.
W75-02457

REPORT ON WATER RESOURCES ACTIVITIES IN NEW ZEALAND,
Ministry of Works and Development, Christchurch (New Zealeand). Water and Soil Div.
For primary bibliographic entry see Field 2A.
W75-02459

WATER RESOURCES IN POLAND--TODAY AND IN THE FUTURE,
Technical Univ. of Warsaw (Poland). Inst. of Environmental Engineering.
For primary bibliographic entry see Field 2A.
W75-02461

WATER RESOURCES, WATER USE AND WATER ADMINISTRATION IN SWEDEN,
International Hydrological Decade, Stockholm (Sweden). Swedish National Committee.
For primary bibliographic entry see Field 2A.
W75-02464

REVIEW OF WATER RESOURCES IN BRAZIL,
Universidade Federal do Rio Grande do Sul, Porto Alegre (Brazil). Hydraulic Research Inst.

For primary bibliographic entry see Field 2A.
W75-02467

THREE CENTURIES OF SCIENTIFIC HYDROLOGY.
For primary bibliographic entry see Field 2A.
W75-02471

HYDROLOGY AND WATER RESOURCES DEVELOPMENT,
Rijkswaterstaat, The Hague (Netherlands).
For primary bibliographic entry see Field 2A.
W75-02478

AQUATIC-USE PATTERN FOR SILVEX,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
E. O. Gangstad, J. H. Steenis, E. W. Whitney, W. R. Mullison, and F. B. McGilvrey.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-769 583. Aquatic Plant Control Program Technical Report 5, October 1973. 133 p, 4 fig, 33 tab, 28 ref.

Descriptors: *Pesticide residues, *Aquatic weed control, *Toxicity, *Herbicides, Crops, Formulation, Alligatorweed, North Carolina, Submerged plants, Wildlife, Fish, Invertebrates, Aquatic insects, Environmental effects, Rates of application.
Identifiers: *Silvex, Kuron, Waterlily, Pickerelweed, Milfoil.

The herbicide silvex (2(2,4,5-trichlorophenoxy) propionic acid) has been widely used for control of woody and aquatic vegetation for 20 years. Laboratory analysis showed that residues in fish were reduced to less than 0.4 ppm one week after treatment and less than 0.1 ppm two weeks after treatment. Invertebrates contained silvex residues in varying concentrations for more than seven weeks. Minimum residues of silvex were present in the hydrosoil and water up to seven months. Chemical, physical, and biological properties of silvex are summarized. Kuron, which contains silvex, is effective on several submerged and emerged aquatic weeds. Applications to still water at 5 qt per acre-ft are suggested for general aquatic weed control. Operational application of granular silvex early in the season and prefrost applications late in the season have resulted in control of most alligator weed in Lake Marion Reservoir where about 10,000 acres of the reservoir had been invaded by alligator weed. Field observations indicated that silvex at the concentration applicable in treating alligator weed was toxic to certain fish species at one study area. The herbicide concentrations found in irrigation water are unlikely to cause injury to crops. (Jones-Wisconsin)
W75-02504

A WATER POLICY-LAND USE COMPUTER SIMULATION MODEL,
Missouri Univ., St. Louis. Dept. of Quantitative Management.
For primary bibliographic entry see Field 6A.
W75-02507

PROBLEMATIC CONSIDERATIONS OF AQUATIC WEED CONTROL (ANALYSE DE LA PROBLEMATIQUE DU CONTROLE DE LA VEGETATION AQUATIQUE),
National Inst. of Scientific Research, Quebec.
For primary bibliographic entry see Field 2I.
W75-02578

ESTIMATING AVERAGE SEDIMENT YIELDS FROM ANNUAL STREAMFLOW AND SEDIMENT RECORDS,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W75-02669

A STATISTICAL TREATMENT OF URBAN DRAINAGE DESIGN,
Sheffield Univ. (England).
E. J. Sarginson.
Journal of the Institution of Municipal Engineers, Vol 100, No 5, p 152-154, May 1973. 4 fig, 3 tab, 6 equ, 4 ref.

Descriptors: *Urban drainage, *Statistical methods, *Storm water, *Flow, *Urban runoff, *Meteorological data, Rainfall-runoff relationships, Equations, Paving, Slopes, Hydrologic data.
Identifiers: Computation, Catchments.

Development in methodology for computing urban stormwater runoff is reviewed. Specifically criticized is a previous paper (Sarginson and Bourne, 1969) in which the Transport and Road Research Lab's (TRRL) method was discussed in detail and in which an attempt was made to formulate a means of computation for reproducing more accurately the mechanics of urban runoff. Subsequent observation has shown there is nearly always a momentary time lag between storm commencement and the beginning of discharge from sewer outfall. For a particular catchment, the rainfall volume involved between the commencement of the two events is constant, and this volume can be treated as water stored in surface depressions. The remaining rainfall loss is then treated as infiltration into permeable parts of the catchment. This article asserts that both surface depression storage and infiltration vary from one catchment to another and that it will be some time before reliable values for these two quantities can be recommended for design purposes. In the meantime, it is suggested that a statistical treatment of existing urban runoff data should provide a reliable method of computing stormwater flows. This article attempts such statistical analysis. Examined is the correlation between proportional runoff and the slope of the catchment. Comparing rainfall intensities given in TRRL data with a standard design storm proposed by the Meteorological Office, a confidence level appropriate to design is derived. Results provide only 1.3% probability that the computed discharge would be exceeded in the design period. (Bell-Cornell)
W75-02680

SKEWNESS AND KURTOSIS INFLUENCE ON UNIFORMITY COEFFICIENT, AND APPLICATION TO SPRINKLER IRRIGATION DESIGN,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W75-02709

HYDRAULICS AND UNIFORMITY FOR DRIP IRRIGATION,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W75-02711

4B. Groundwater Management

EFFECT OF IRRIGATION MANAGEMENT ON SOIL-WATER RELATIONSHIPS IN STRATIFIED SOILS,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 2G.
W75-02351

THE USE OF RADIOISOTOPES IN TRACING KARST GROUNDWATER IN GREECE, IV,
Democritus Nuclear Research Center, Athens (Greece).
For primary bibliographic entry see Field 2F.
W75-02371

HORIZONTAL FLOW IN HYDROTHERMAL SYSTEMS,
New Zealand Geological Survey, Rotorua.
For primary bibliographic entry see Field 2F.
W75-02382

THE SIGNIFICANCE OF GEOLOGY IN SOME CURRENT WATER RESOURCE PROBLEMS, CANTERBURY PLAINS, NEW ZEALAND,
New Zealand Geological Survey, Christchurch.
For primary bibliographic entry see Field 2A.
W75-02383

STATUS OF WATER RESOURCES IN EGYPT,
For primary bibliographic entry see Field 2A.
W75-02441

THE STATUS OF KENYA'S WATER RESOURCES AND THEIR DEVELOPMENT,
Nairobi Univ., Kenya. Dept. of Physical Geography.
For primary bibliographic entry see Field 2A.
W75-02442

EFFECT OF OIL REFINERY EFFLUENT ON THE SHALLOW GRAVEL AQUIFER IN ZERQA AREA-JORDAN,
Natural Resources Authority, Amman (Jordan).
For primary bibliographic entry see Field 5B.
W75-02455

ACCELERATION OF POLLUTION AND SALINIZATION PROCESSES BY CONVECTION CURRENTS IN AQUIFERS,
Technion--Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-02465

GEOHYDROLOGY OF THE YUMA AREA, ARIZONA AND CALIFORNIA,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W75-02487

RECONNAISSANCE INVESTIGATION OF GROUND WATER IN THE RIO GRANDE DRAINAGE BASIN--WITH SPECIAL EMPHASIS ON SALINE GROUND-WATER RESOURCES,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-02489

WATER-LEVEL CHANGES IN WEST-CENTRAL KANSAS, 1950-74,
Geological Survey, Garden City, Kans.
M. E. Pabst, and E. D. Jenkins.
Kansas Geological Survey Journal, October 1974. 15 p, 1 fig, 1 plate, 2 tab, 12 ref.

Descriptors: *Water levels, *Groundwater, *Kansas, Water wells, Irrigation water, Withdrawal, Drawndawn, Water level fluctuations, Data collections.

The water level in wells has declined as much as 52 feet since 1950 in parts of west-central Kansas, primarily as a result of groundwater withdrawals for irrigation. During 1950-73, the number of irrigation wells increased from about 250 to 2,300, and annual withdrawals are estimated to have increased from 40,000 to 450,000 acre-feet. (Knapp-USGS)
W75-02490

WATER WELLS AND SPRINGS IN THE EASTERN PART OF THE UPPER SANTA MAR-

GARITA WATERSHED, RIVERSIDE AND SAN DIEGO COUNTIES, CALIFORNIA,
Geological Survey, Garden Grove, Calif.
F. W. Giessner, and M. J. Mermod.
Available from State of California, Documents Section, P. O. Box 20191, Sacramento, Calif. 95802. California Department of Water Resources, Sacramento, Bulletin No 91-22, August 1974. 213 p, 14 maps, 7 ref.

Descriptors: *Basic data collections, *Groundwater, *California, Hydrologic data, Alluvium, Aquifers, *Water wells, Hydrogeology, Groundwater basins, *Springs.
Identifiers: *Santa Margarita watershed(Calif), Riverside County(Calif), San Diego County(Calif).

All available groundwater data for the upper Santa Margarita watershed, California, are tabulated to provide public agencies and the general public with data for an overall groundwater investigation of the area and for planning water utilization and developmental work. The scope of the work includes (1) brief reconnaissance of major geologic features to determine the extent and general character of the deposits that contain groundwater; (2) field examination of most water wells and springs in the area to determine their location with respect to the geographic and cultural features and the public-land net and to record well depths and sizes, types and capacities of pumping equipment, uses of the water, and other pertinent information available at the well site; (3) measurement of the depth to water below land surface; and (4) collection and tabulation of well records, including water-level measurements, chemical analyses, and pumping-test data. The eastern part of the upper Santa Margarita River watershed area covers about 250 square miles in the southwestern part of Riverside County and about 85 square miles in the northwestern part of San Diego County. The total watershed area is about 335 square miles. Consolidated rocks include the igneous and metamorphic rocks of pre-Tertiary age. These rocks form the basement complex that underlies the unconsolidated deposits. The basement complex locally yields small quantities of water to wells from joints, fractures, and weathered zones. The unconsolidated deposits consist of sedimentary material deposited during Quaternary time. Where saturated, these deposits yield water freely to wells. (Knapp-USGS)
W75-02492

GROUND-WATER LEVELS IN WYOMING, 1972-1973,
Geological Survey, Cheyenne, Wyo.
For primary bibliographic entry see Field 7C.
W75-02494

A CONCEPTUAL MODEL OF THE HYDROLOGIC SYSTEM SUPPLYING THE LARGE SPRINGS IN THE OZARKS,
Geological Survey, Rolla, Mo.
For primary bibliographic entry see Field 2F.
W75-02495

SPRINGS OF MISSOURI, (WITH SECTIONS ON FAUNA AND FLORA),
Missouri Geological Survey and Water Resources, Rolla.
For primary bibliographic entry see Field 2F.
W75-02496

GROUNDWATER RESOURCES AND POTENTIAL SEWAGE POLLUTION IN SOUTHERN SPOKANE COUNTY,
Eastern Washington State Coll., Cheney. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W75-02509

4C. Effects On Water Of Man'S Non-Water Activities

ECOLOGY PROBLEMS SPELL PROFITS,
Associated Construction Publications, Elmhurst, Ill.
For primary bibliographic entry see Field 5D.
W75-02205

THE ECOSPHERE. ORGANISMS, HABITATS AND DISTURBANCES,
C. L. Rodgers, and R. E. Kerstetter.
Harper and Row, New York, 1974. 341 p, Illus, Maps.

Descriptors: *Environment, *Habitats, *Ecology.
Identifiers: Air, Book, Forest, Lakes, Streams, Water.

This book provides an assessment of man's impact and potential in the natural environment. It reviews some historical highlights of man's changing role in the environment, describes the major terrestrial and aquatic communities of organisms, and deals with environmental problems and their possible solutions. It explores such problems as growth of population, exploitation of resources, and pollution. The vol. is divided into 3 parts. The 1st part deals with man's past concern for the environment. The 2nd part discusses natural communities, and habitats with relation to man and includes such topics as: forests, grasslands, deserts and tundras, streams and lakes and oceanic and tidal environments. The 3rd part concerns man's impact on the ecosystem. Included in this section are chapters on productivity, populations, human food supply and air, water and solid waste pollutants. A glossary includes terms introduced in the book. Names and addresses of private and governmental organizations dealing with environmental problems are listed. Enumerated by state in another appendix are many protected locations where distinctive habitats or plants and animals may be found. Students and workers in the field of ecology should find this book useful.--Copyright 1974, Biological Abstracts, Inc.
W75-02532

TECHNICAL ADVANCE IN AGRICULTURE AND SOIL PROTECTION, (IN POLISH),
W. Niewiadomski.
Postepy Nauk Roln, Vol 20, No 5, p 25-35, 1973.

Descriptors: *Soil erosion, *Soil conservation, Minning, Air pollution effects.

The necessity of developing methods for soil protection from damages caused by weather, air pollution and industry, are described. The negative effect of drying out of light soils, water erosion, the exploitation of soils by the search of cheap fuel (coal), mechanical devastation due to repetitious cultivation, faulty fertilization and exhaustion of the soil are discussed. A program for soil protection and productivity is presented.--Copyright 1974, Biological Abstracts, Inc.
W75-02548

TRANSACTIONAL DYNAMICS OF POULTRY MANURE IN SOIL,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 5C.
W75-02575

A COMPARISON OF DATA FROM AGRICULTURAL SOIL SURVEYS WITH ENGINEERING INVESTIGATIONS FOR ROADWORKS IN AYRSHIRE,
University of Strathclyde, Glasgow (Scotland). Dept. of Civil Engineering.
A. Mc Gown, and P. Iley.
J Soil Sci. Vol 24, No 2, p 145-156, 1973. Illus.

Descriptors: *Soil surveys, Road construction.
Identifiers: Agricultural, Ayrshire, Engineering, Information, Liaison, Roadworks, Scotland, Soil, Surveys.

Recently a number of outline soil survey maps, on a scale 1:25,000, each covering some 100 km2, were made available by the Soil Survey of Scotland to County Advisory Officers, Planning Officers, and others who have specialist requirements. In North Central Ayrshire a number of major roadworks were completed in recent years, and the Kilmarnock and Hurlford Bypasses are at present under construction. Site investigations were undertaken in connection with these works and construction records kept. These make possible the assessment of the usefulness of the soil survey maps for initial route and realignment planning of roads. The delineation of the various soil associations on the soil survey maps related very closely to the limits of the various engineering soils encountered. The groupings adopted by the soil surveyors for boulder clays, were found to be narrower than presently required by engineers, while the groupings adopted with respect to the raised beach and alluvial deposits too wide. The engineering behavior of boulder clays needs closer examination, and any correlations between engineering and soil association groupings should be sought. If the grading, water content, and bulk density of the raised beach sands and gravels could be given by the soil survey, this information would permit engineers to make a much better judgment of the road-bearing capacity of these materials. Alluvial deposits should be similarly tested and distinguished as either riverine or lacustrine deposits. To avoid duplication of effort in the future when geotechnical maps are produced and to gain the maximum benefit of the information so far collected, a closer liaison between engineers and the Soil Survey of Scotland is suggested.--Copyright 1974, Biological Abstracts, Inc.
W75-02596

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS: DELAWARE RIVER ESTUARINE MARSH SURVEY.
Academy of Natural Sciences of Philadelphia, Pa., and Delaware Univ., Newark.
For primary bibliographic entry see Field 2L.
W75-02621

REGIONAL ENVIRONMENTAL QUALITY: AN OPTIMAL INDUSTRY MIX TO MINIMIZE POLLUTION,
Mars Hill Coll., S.C.; and Clemson Univ., S.C.
For primary bibliographic entry see Field 6B.
W75-02664

4D. Watershed Protection

EFFECT OF PRESCRIBED BURNING ON SEDIMENT, WATER YIELD, AND WATER QUALITY FROM DOZED JUNIPER LANDS IN CENTRAL TEXAS,
Texas Tech Univ., Lubbock. Dept. of Range and Wildlife Management.
For primary bibliographic entry see Field 4A.
W75-02345

VEGETATION AND FLORA OF FLOOD-SUSCEPTIBLE REGIONS OF THE CRIMEA AND THEIR USE FOR EROSION CONTROL, (IN UKRAINIAN),
Akademiya Nauk URSR, Kiev. Instytut Botaniki.
M. I. Kotov, and P. Ya. Popovych.
Ukr Bot Zh. Vol 29, No 3, p 344-351. Illus. 1972. English summary.

Descriptors: *Erosion control, *Vegetation effects, USSR, *Reforestation.

Identifiers: Astragalus arnacantha, Carpinus orientalis, Crimea, Dorychium herbacium, Elytrigia scythica, Festuca sulcata, Lamyra echinocephala, Medicago cretacea, Melica taurica, Pinus pallasiana, Pistacia mutica, Quercus pubescens.

On the basis of 6-yr expeditionary investigations in the Mountain Crimea (USSR), 4 main flood susceptible regions are distinguished: main south-eastern; south-western, northern and submontane. Mud phenomena are developed especially greatly in the 1st Sudak region, the driest one, where they are formed in exposure places of flysch Taurian (Upper-Jurassic) and Upper-Jurassic conglomerates. Vegetation is presented by steppe grass-semi-shrub and shrub formations of the phrygana type in combination with the shibliak formations. The forest vegetation possesses the greatest antierosive and antimud properties. The assortment of trees and shrubs for afforestation (Carpinus orientalis Mill., Quercus pubsecens Willd., Pistacia mutica F. et M., Pinus pallasiana Lamb., etc.) and that of herbaceous vegetation for ground cover (Festuca sulcata Hack., Elytrigia scythica Nevski, Melica taurica C. Koch, Medicago cretacea (M. B.) Grossh., Astragalus arnacantha M. B., Lamyra echinocephala Willd., Dorycnium herbaceum C. Koch, etc.) are suggested.--Copyright 1974, Biological Abstracts, Inc.
W75-02540

TWO NEW VEGETAL ASSOCIATIONS FROM THE SAMOBORSKO GORJE REGION, (IN CROATIAU),
Institut za Botaniku, Zagreb (Yugoslavia).
I. Sugar.
Acta Bot Croat. 32, p 197-202, Illus, 1973. French summary.

Descriptors: *Biological communities, Succession, *Soil erosion, Yugoslavia.
Identifiers: Calluna-vulgaris, Erica-carnea.

Two new vegetal associations (Bromo-Danthonietum and Molinio-Quercetum petraeae) were described for the Samoborsko gorje region near Zagreb, Yugoslavia. The association Bromo-Danthonietum, which develops in relatively shallow, humus-rich soils of mountain plateaux or depressions, has also been cited in the Lika (licka-Pljesivica) and Gorski Kotar regions. It is closely related to several other Festuco-Brometea associations. The association Molinio-Quercetum develops in shallow broan acid soils exclusively in quartz conglomerates. Due to this association's formation of a dense root network, it is considered to be valuable in fighting soil erosion and deforestation. The plants Calluna vulgaris, Erica carnea and the association Luzulo-albidae-Fagetum were also discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-02545

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

PORTABLE DEVICE TO MEASURE INDUSTRIAL WASTEWATER FLOW,
North Star Research and Development, Minneapolis, Minn.
R. Forester, and D. Overland.
Journal Water Pollution Control Federation, Vol 46, No 4, p 777-778, April, 1974.

Descriptors: *Monitoring, *Flow measurement, Open channel flow, Pumps, *Instrumentation, Sampling, Measurement, *Waste water, Measurement, Flow rates.

A procedure of monitoring pumps to provide a record of pump operating time which defines both the total flow and the flow during any time period is described. The data obtained by the pump cycle recorded can be used to proportion individual samples from an automatic sampler into a composite sample and also to measure total flow. The pump cycle measuring device is rugged, inexpensive, small, lightweight, requires no precision in alignment, and is easily and rapidly installed by one person. (Sandoski-FIRL)
W75-02213

SPECTROSCOPIC DETERMINATION OF TRACE ELEMENTS IN SEWAGE SLUDGES,
Polytechnic Wolverhampton (England).
G. Beech.
Journal of Chemical Education, Vol 51, No 5, p 328, May, 1974. 1 tab.

Descriptors: *Sewage sludge, *Fertilizers, *Copper, *Nickel, *Zinc, *Spectrophotometry, Analytical techniques, Heavy metals, Toxicity, Domestic wastes, Industrial wastes, *Trace elements, Europe, *Pollutant identification.

Atomic absorption spectrophotometry was used to quantitatively analyze samples for copper, nickel, and zinc. Results for domestic and industrial sludge samples indicated a total of 7340-7800 ppm of zinc of which 3100-4760 ppm are extractable; 930-1250 ppm of copper with 10-19 ppm extractable; and, 280-580 ppm nickel with 252-357 ppm being extractable. (Sandoski-FIRL)
W75-02214

SELF-CONTAINED SAMPLING AND MEASUREMENT SYSTEM FEATURES RESPIROMETER.
Robertshaw Controls Co., Richmond, Va.
For primary bibliographic entry see Field 5D.
W75-02225

MEASURING OPEN CHANNEL WASTEWATER FLOWS,
Leupold and Stevens, Inc., Beaverton, Oreg.
R. S. Blois.
Industrial Wastes, Vol 19, No 6, p 20-22, November/December, 1973. 3 fig, 2 ref.

Descriptors: *Measurements, *Flow measurements, *Open channel flow, *Waste water(Pollution), Instrumentation, *Federal Water Pollution Control Act, Recording, Weirs, Water supply, Sewage, Liquid wastes, Monitoring, Industrial wastes, Municipal wastes, Discharge, Water pollution, Costs, *Pollutant identification.

Since the 1972 Federal Water Pollution Control Act Amendments, industrial and municipal wastes must be recorded in terms of amount of discharge. Measurement of flow is not only legally required for monitoring pollution, but is also economically useful for an individual industry to be able to locate unnecessary discharge caused by accident such as by the opening of valves in fresh-water washlines for extended periods of time. Types of flow measurements include recording devices such as a weir with a stilling well and recorder. Other methods are remote operation, the capacitance type probes, or bubbler devices. Selection of a feasible method should depend upon site conditions, expected flow range, type of liquid (sewage, waste water, water supply for irrigation), allowable head loss, required accuracy, and allowable expense. (Prague-FIRL)
W75-02226

WATER POLLUTION SAMPLING, MONITORING AND ANALYSIS INSTRUMENTATION,
Newark Coll. of Engineering, N.J. Dept. of Civil and Environmental Engineering.
P. N. Chermisinoff.
Pollution Engineering, Vol 6, No 4, p 36-48, April, 1974. 37 fig.

Descriptors: *Instrumentation, *Monitoring, *Measurement, *Sampling, *Water quality, On-site investigations, Recording, Water pollution control, Regulation, Carbon absorption, Ion exchange, Spectrophotometry, Temperature, Density, Information, Systems analysis, Reviews, *Pollutant identification.
Identifiers: Waste water systems.

Sampling and monitoring of water quality include on-site measurements and procedures which remove water from its environment for off-site analyses. Purposes cited include: ensuring proper operating conditions in the process plant; providing a continuous and permanent record of process and waste water handling; ensuring efficiency and reliability of manufacturing operations and waste processing; providing a basic tool for pollution control; and ensuring that standards of environmental quality set by regulatory agencies be met. Types of samples are the individual grab sample, simple composite sample, sequential composite sample, continuous sample, hand proportioned composite sample, and automatic proportioned composite sample. In analyzing waste water systems, separation and concentration methods are used. These include carbon absorption, ion exchange, freeze concentration, chromatography, and liquid-liquid extraction. Types of spectrophotometry are detailed. Physical parameters for water pollution recorded include temperature, electrical conductance, density, turbidity, viscosity, volatility, and particulate and dissolved solids. Temperature is also measured by varying methods. A list of about one hundred corporations for instrumentation is given for additional information about specific methods. (Prague-FIRL)
W75-02228

COLLABORATIVE TESTS OF WATER ANALYSIS (THE CHEMAQUA PROGRAMME),
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Chemistry Div.
M. Kingsford, C. D. Stevenson, and W. H. L. Edgerley.
New Zealand Journal of Science, Vol 16, p 895-902, March, 1973. 2 tab, 4 ref.

Descriptors: *Analytical techniques, *Water supply, *Sampling, *Inorganic material, *Carbonates, Conductivity, Laboratory analysis, Estimating, *Pollutant identification, *Sulfates.
Identifiers: *New Zealand.

Sixteen New Zealand laboratories have analysed two water samples for various inorganic constituents. The methods used to determine carbonate were unsatisfactory, and a better method is needed to analyse for low levels of sulphate. The total errors for the remaining estimations were less than 25 percent. These estimations could be rated as excellent, the most precise being that of conductivity. (Prague-FIRL)
W75-02231

DIRECT TWO-PHASE TITRATION METHOD FOR ANALYZING ANIONIC SURFACTANTS IN FRESH AND SALINE WATERS,
Rensselaer Polytechnic Inst., Troy, N.Y.
L. K. Wang, and P. J. Panzardi.
Technical Report No IBN-25, June, 1974. 19 p, 3 tab, 3 fig, 3 ref.

Descriptors: *Surfactants, *Detergents, Saline water, Sea water, *Pollutant identification, Analytical techniques, Water analysis, Volumetric analysis, Aqueous solutions, *Solvents, Anions, Linear alkylate sulfonates.
Identifiers: Quarternary ammonium salt, Two-phase titration, Azure A, Methyl orange, *Anionic surfactants.

Two direct titration methods for the analysis of anionic surfactants in aqueous solutions have been developed. The first method involves the use of quarternary ammonium salt as titrant, chloroform

as organic solvent, and azure A and methyl orange as dyes. The second method is identical to the first method except that carbon tetrachloride is used as organic solvent to replace chloroform. Either method can be used to analyze the anionic surfactants in both fresh and saline waters.
W75-02237

EVALUATION OF IMPROVED TWO-PHASE TITRATION METHODS AND A FIELD TEST KIT FOR ANALYZING IONIC SURFACTANTS IN WATER AND WASTEWATER,
Calspan Corp., Buffalo, N.Y. Environmental Systems Dept.
L. K. Wang.
Project Report No ND-5296-M-3, July 1973. 17 fig, 18 ref.

Descriptors: *Surfactants, *Detergents, Aqueous solutions, Saline water, Sea water, Water analysis, *Pollutant identification, Analytical techniques, *Volumetric analysis, Linear alkylate sulfonates, Alkylbenzene sulfonates, Anions, Cations.
Identifiers: Quarternary ammonium salt, Sodium tetraphenylboron, Two-phase titration method, *Ionic surfactants.

A two-phase titration method was evaluated for its feasibility to determine the concentrations of linear alkylate sulfonate (LAS), branched-chain alkyl benzene sulfonate (ABS), quaternary ammonium compounds, algicide, dishwashing detergents, laundry detergents, and soaps in water or wastewater. It was found that both cationic and anionic surfactants in either fresh water or saline water can be quantitatively determined by the two-phase titration method. Based on the principle of the two-phase titration method, a field test kit was developed. The test kit includes a separatory funnel, a titration burette, a set of liquid measuring apparatus, and chemicals. The test kit is compact and its operational procedure is simplified to enable Army wastewater treatment personnel to determine the detergent content of field military wastewater, as well as the concentrations of certain organic flocculants.
W75-02238

BIOLOGICAL FIELD AND LABORATORY METHODS FOR MEASURING THE QUALITY OF SURFACE WATERS AND EFFLUENTS.
National Environmental Research Center, Cincinnati, Ohio. Analytical Quality Control Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-227 183, $7.00 in paper copy, $2.25 in microfiche. EPA-670/4-73-001, July 1973. 187 p, 18 fig, 24 tab, 3 append, 712 ref.

Descriptors: *Sampling, *On-site investigations, *Laboratory tests, *Water quality, *Methodology, Fishkills, Effluents, Freshwater, Sea water, Equipment, Plankton, Aquatic plants, Invertebrates, Fish, Bioassay, Measurement.
Identifiers: *Biometrics.

This mriual was developed to provide pollution biologists with the most recent methods for measuring the effects of environmental contaminants on freshwater and marine organisms in the field and laboratory studies for establishing water quality criteria. The chapter on biometrics presents some of the basic concepts and techniques of sampling design and data evaluation. Sample collection and preservation of plankton are given. In biomass determination, currently used indices include dry and ash-free weight, cell volume, cell surface area, total carbon, total nitrogen, and chlorophyll content. Periphyton have proven useful in reconnaisance surveys, water quality monitoring studies, short-term investigations, research and development, and enforcement studies. Concerning macrophytes, many pollutants have dramatic effects on macrophyte growth. Gear for qualitative sampling is varied and choice of tools depends on water depth. A statistical design assists in determining the best procedure for quantitative sampling. Qualitative and quantitative sampling of macroinvertebrates is described. The condition of the fishery is the most meaningful index of water quality to the public. Two kinds of bioassays are laboratory tests conducted to determine the effects of a substance on species and in situ tests to determine the effects of a specific natural environment. (Jones-Wisconsin)
W75-02258

METHOD FOR SIMULTANEOUS DETERMINATION AND IDENTIFICATION OF MS-222 AND METABOLITES IN FISH TISSUES,
Southeastern Fish Control Lab., Warm Springs, Ga.
C. W. Luhning.
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis., Report No 51. 10 p, 3 fig, 2 tab, 5 ref.

Descriptors: *Fish control agents, *Analytical techniques, Aromatic compounds, Chromatography.
Identifiers: *Fish anesthetics, m-aminobenzoic acid, Residues, MS-222.

MS-222 (methanesulfonate of meta-aminobenzoic acid ethyl ester) is a commonly used fish anesthetic. When any chemical or drug is used on a food commodity, the Food and Drug Administration requires data on residual amounts of the drug and its methabolites left in the commodity after treatment. The analytical and confirmatory methods described will effectively determine residues of MS-222 and its metabolites and positively confirm which metabolites of MS-222 are present. The thin-layer chromatographic procedures are done simultaneously with the analytic procedures. Different species of fish seem to eliminate residues of MS-222 by various means of excretion and deactivation, which in turn influences the amount of metabolites present in the muscle. Recovery of the compounds from spiked samples of muscle and liver tissues ranged from 82.7 to 110.3% for MS-222 and from 84.0 to 116.9% for m-aminobenzoic acid. The Rf values for the azo dyestuff of MS-222 and m-aminobenzoic acid are near 0.83 and 0.18%, respectively. Quantitative estimation and identification by the TLC method were possible from samples spiked with as little as 1 microgram/g of MS-222 or m-aminobenzoic acid. (Jones-Wisconsin)
W75-02261

RESIDUES OF MS-222, BENZOCAINE, AND THEIR METABOLITES IN STRIPED BASS FOLLOWING ANESTHESIA,
Southeastern Fish Control Lab., Warm Springs, Ga.
C. W. Luhning.
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis., Report No 52. 11 p, 1 fig, 6 tab, 11 ref.

Descriptors: *Analytical techniques, *Fish control agents, Bass, Colorimetry, Chromatography.
Identifiers: *Residues, *MS-222, m-aminobenzoic acid, Benzocaine, Fish anesthetics.

The amount of MS-222 and m-aminobenzoic acid residues in muscle tissue of striped bass anesthetized with MS-222 was determined. Analyses of benzocaine, a structural analogue of MS-222, and p-aminobenzoic acid residues in muscle tissue of striped bass, bluegill, and largemouth bass anesthetized with benzocaine were included for comparison. Twenty striped bass were anesthetized in a 100-mg/l solution of MS-222 at 17.5C. Striped bass rapidly hydrolyzed the m-aminobenzoic acid ethyl ester to m-aminobenzoic acid during exposure and withdrawal. During the first four hours of recovery, residues of m-aminobenzoic acid dissipated from the muscle tissue more slowly than did the MS-222 residues. Among the fish analyzed to date, only the striped bass effectively hydrolyzes the MS-222 ester. Hydrolysis of MS-222 also occurs in frozen homogenized muscle tissue from treated striped bass. A reduction in the concentration of MS-222 residues after one week storage at 1.7C in bluegill and largemouth bass muscle tissue was due mainly to the acetylation of the free amine. Analysis of striped bass muscle tissue for MS-222 residues must be done soon after the fish are killed to determine the parent drug rather than its acid metabolite. (Jones-Wisconsin)
W75-02262

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT. VOLUME II. WATER QUALITY DETERMINATIONS,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 5C.
W75-02283

ANALYSIS OF NONIONIC DETERGENTS IN RAW SURFACE WATERS BY THIN-LAYER CHROMATOGRAPHY AND INFRARED SPECTROSCOPY,
Federal Water Pollution Control Administration, Cincinnati, Ohio. Div. of Pollution Surveillance.
D. Smith, and J. J. Lichtenberg.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-227 651, $3.75 in paper copy, $2.25 in microfiche. Report No 27, May 1967. 34 p, 8 fig, 3 tab, 17 ref.

Descriptors: *Analytical techniques, *Surfactants, *Detergents, Chromatography, Spectroscopy, Foaming, Monitoring.
Identifiers: *Nonionic detergents.

Water treatment plant operators noted foaming on the river being used as a source, as well as in the treatment plant. During the investigation of the foaming problem, the need for a rapid and sensitive method for detection of nonionic detergents was recognized. The thin-layer chromatography method was developed to meet this need. Varying combinations of several solvent systems were studied. The proper solvent mixture provides good resolution of the nonionics. Two solvent systems were employed for the TLC development. Solvent system I, benzene/cyclohexane/diethylamine was found to be the most satisfactory for comparison of intensity of sample spots with standards for quantitative determination. Solvent system II was used to develop the typical 'polyoxyethylene spectrum' and thus confirm the presence of the nonionic compounds. This TLC method using ammonium colbaltothiocyanate for detection of low ppb quantities of nonionic surface agents is presented. The method has been applied to surface water samples obtained by the carbon adsorption and grab methods. When sufficient sample is available, a PMA-IR spectroscopy technique is used for additional verification of the results. (Jones-Wisconsin)
W75-02289

ODOR MEASUREMENT FOR LIVESTOCK FEEDING OPERATIONS,
Texas Agricultural Extension Service, College Station.
J. M. Sweeten, D. L. Reddell, and H. B. H. Cooper.
Presented at Specialty Conference on Control Technolgy for Agricultural Air Pollutants, Air Pollution Control Association--Southern Region, Memphis, Tennessee, March 18-19, 1974. 25 p, 8 fig, 8 tab, 25 ref.

Descriptors: Odor, *Confinement pens, *Farm wastes, Livestock, *Air pollution, Hogs, Organoleptic properties, *Pollutant identification.
Identifiers: *Odor control, *Odor measurement, Scentometer, Intensity, Organoleptic tests, Vapor dilution, Liquid dilution, Matching standards tests.

The odor problem is easy to detect, but hard to solve in livestock feeding operations. The key to odor control is odor measurement. Techniques used in odor detection and measurement are reviewed. Methods which measure odor intensity include static and dynamic vapor dilution, liquid dilution, and matching standards tests. Results of experiments measuring odor intensities at cattle feedlots are presented. Also case studies involving scentometer readings are presented for a liquid manure system for swine, an open lot swine operation, and a confinement cattle feeding facility. With these case studies are conclusions and suggestions concerning effective odor abatement. Many areas of research concerning odor which need to be studied are also reviewed. (Russell-East Central)
W75-02342

ANALYSIS OF WATERS FOR NITROGEN,
Connecticut Univ., Storrs.
U. Asrani.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-238 056, $5.25 in paper copy, $2.25 in microfiche. MS Thesis, 1973. 115 p, 14 fig, 22 tab, 52 ref. OWRT A-030-CONN(4).

Descriptors: *Nitrogen, *Nitrogen compounds, Evaluation, Analysis, *Analytical techniques, Laboratory tests, *Water analysis, Chemical analysis, Water quality, Ammonia, Ammonia salts, Nitrates, Nutrients, Testing, Instrumentation, Chemistry, Performance, *Pollutant identification.
Identifiers: *Total nitrogen analyzer, Kjeldahl method, Direct Nesslerization method, Titrimetric Finish method, Brucine Ultraviolet Spectrophotometry method, Ion Selective Probe method, Automated Hydrazine Reduction method.

To prevent the adverse effects caused by certain forms of nitrogen on the aquatic environment, it is critical to develop appropriate analytical techniques for their determination. The performance of some of the current techniques for nitrogen determination was evaluated under interference and interference-free conditions. The specific objectives were: (1) to compare some of the techniques on the basis of accuracy, precision, sensitivity, and time of analysis; (2) to correlate, if possible, the different techniques for each form of nitrogen; and (3) to confirm the possibility of a single technique (Total Nitrogen Analyzer) that is used for separate analysis of organic nitrogen, ammonia, and nitrate. The analytical techniques included were: the Kjeldahl method for analysis of organic nitrogen; the Titrimetric Finish and Direct Nesslerization methods for analysis of ammonia; the Brucine, Ultraviolet Spectrophotometry, Ion Selective Probe, and Automated Hydrazine Reduction methods for nitrate, and the total nitrogen analyzer for total nitrogen and, if possible, for the analysis of organic, ammonia, and nitrate nitrogen as well. Results were summarized in tables. (Henley-ISWS)
W75-02360

RADIOMETRY OF WATER TURBIDITY MEASUREMENTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
W. R. McCluney.
Available from the National Technical Information Service, Springfield, Va. 22161 as N74-23048, $3.75 in paper copy, $2.25 in microfiche. National Aeronautics and Space Administration-TM-X-70641, April 1974. 22 p, 3 fig, 44 ref.

Descriptors: *Turbidity, Evaluation, *Water analysis, *Instrumentation, *Analytical techniques, Testing, Testing procedures, Physical properties, Water quality, Optical properties, Light penetration, Secchi disks, Opacity, Measurement, Suspended solids, Absorption.
Identifiers: *Turbidimeters, *Formazin Turbidity Unit.

An examination of a number of measurements of turbidity reported in the literature revealed considerable variability in the definitions, units, and measurement techniques used. Many of these measurements differ radically in the optical quantity measured. The radiometric basis for each of the most common definitions of turbidity was examined. Several commercially available turbidimeters were described and their principles of operation were evaluated radiometrically. It was recommended that the term turbidity be restricted to measurements based upon the light scattered by the sample with that scattered by standard suspensions of known turbidity. It was also recommended that the measurement procedure be standardized by requiring the use of Formazin as the turbidity standardizing material and that the Formazin Turbidity Unit (FTU) be adopted as the standard unit of turbidity. (Henley-ISWS)
W75-02365

LABORATORY EVALUATION OF DISSOLVED OXYGEN ANALYZERS,
Instrumentation Center, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-11145, $3.25 in paper copy, $2.25 in microfiche. National Oceanographic Instrumentation Center Technical Bulletin RN-1007, September 1972. 12 p, 22 fig,

Descriptors: *Dissolved oxygen analyzers, Evaluation, *Performance, Dissolved oxygen, *Measurement, *Water analysis, Instrumentation, Reliability, Oxygen, Water quality, Chemical analysis, *Analytical techniques, Specifications, Testing, Water properties, Laboratory tests, Oceanography, *Pollutant identification.
Identifiers: Instrument fact sheets.

Laboratory evaluations were made of four dissolved oxygen meters. The results were reported in individual Instrument Fact Sheets, that is IFS-73003 for Beckman Instruments Model 735 Dissolved Oxygen Analyzer; IFS-73004 for Beckman Instruments MINOS DOM Dissolved Oxygen Monitor; IFS-73005 for Ionics Model 1131 Dissolved Oxygen Analyzer; and IFS-73006 for Hydrolab Model 11A Portable Water Quality Analyzer. Selected manufacturers performance specifications and the test results were presented in tables. (Henley-ISWS)
W75-02368

STATISTICAL ANALYSIS OF DAILY WATER QUALITY DATA,
Rutgers--The State Univ., New Brunswick, N.J. Dept. of Civil Engineering.
E. L. Bourodimos, S. L. Yu, and R. A. Hahn.
Water Resources Bulletin, Vol 10, No 5, p 925-941, October 1974. 6 fig, 3 tab, 26 ref.

Descriptors: *Correlation analysis, *Stochastic processes, *Time series analysis, Mathematical models, Biochemical oxygen demand, Dissolved oxygen, Discharge(Water), Water temperature, Statistical methods, Water quality, Temperature.
Identifiers: Passaic River(Little Falls-NJ).

The stochastic nature of four water quality time series were examined. Nine years of daily observations were divided into a six-year series for the period from 1960 through 1965, and a three-year series from 1967 through 1969. This division into two separate series was made partly because of the construction of a waste treatment plant in 1966 and partly because discharge data were lacking for the years 1967 to 1969. Daily water quality observations used were streamflow, water temperature, dissolved oxygen, and biochemical oxygen demand of the Passaic River at Little Falls, New Jersey. The random component contributes more than 60 percent of the variance in the biochemical oxygen demand series, but only 30 percent or less in the dissolved oxygen series. Autocorrelation analysis suggested that dissolved oxygen and biochemical oxygen demand residu series have a persistence of about 30 days. Significant cross correlation between dissolved oxygen and temperature was found when dissolved oxygen lags temperature for up to 30 days, which indicates that the critical dissolved oxygen probably lags the critical temperature. Spectral analysis showed multiple peaks in the biochemical oxygen demand series, reflecting effects of storm runoff and other nonpoint source pollution on river quality. (Harmeson-ISWS)
W75-02376

SUMMARY REPORT, 1973, FOOD PROTECTION AND TOXICOLOGY CENTER,
California Univ., Davis. Food Protection and Toxicology Center.
Summary Report, 1973. 58 p, 2 fig, 1 tab, 15 ref.

Descriptors: *Pesticides, *Environmental effects, *Toxicity, Chlorinated hydrocarbon pesticides, Insecticides, Organic pesticides, Methodology, Testing procedures, Metabolism, Aquatic life, Crustaceans, Birds, Rodents, Food chains, Animal physiology, Pesticide residues, Soil contamination, Basic data collections, Ecosystems.
Identifiers: Toxicology, Food protection, Biological effects.

The status of multidisciplinary research projects sponsored during 1973 were summarized. Projects were concerned with research and training in five general areas of toxicology: (1) pesticides and related industrial toxicants; (2) naturally occurring toxicants; (3) effects of air pollutants on plant and animal metabolism; (4) transport of toxicants through air, water, and soil; and (5) effects of the use of agricultural chemicals on the health of inhabitants of rural communities. (Humphreys-ISWS)
W75-02379

LIGHT TRANSMISSIVITY, SUSPENDED SEDIMENTS AND THE LEGAL DEFINITION OF TURBIDITY,
University of South Florida, St. Petersburg. Marine Science Inst.
J. C. McCarthy, T. E. Pyle, and G. M. Griffin.
Estuarine and Coastal Marine Science, Vol 2, No 3, p 291-299, July 1974. 2 fig, 2 tab, 30 ref.

Descriptors: *Estuarine environment, *Light penetration, *Sediment control, *Turbidity, *Water quality standards, Sediment load, Water quality control, Optical properties.
Identifiers: Anclote estuary(Fla), Turbidimeter.

A strategy was outlined for estimating estuarine turbidities by in situ optical measurements which are related to Formazin Turbidity Units (FTU) and to concentrations of suspended clay minerals. Plots of percent transmissivity versus FTU and mass concentrations of Kaolinite and Ca-montmorillonite were shown. First order regression analyses of mass concentrations and FTU versus beam attenuation coefficient alpha suggest that FTU and kaolinite concentrations approximate 2 times alpha and montmorillonite concentrations are 4 times alpha in laboratory tests. Field measurements in a west Florida estuary were plotted between the extremes for the laboratory data. The relationship, concentration approximately equal to 3.3 times alpha, determined for the Anclote estuary in August 1971, is compared to the results of other studies in which this relationship ranged between concentration approximately equal to 2.2 alpha and concentration approximately equal to 7.7 alpha. The range of observed variation emphasized the difficulty of attempting to establish equations that are equally applicable in the laboratory or in any geographic field area. Currently defined turbidity standards, based on Jackson Turbidity Units or Formazin Turbidity

Units, and intended for environmental water quality control were defined as ineffective, impractical, and unrealistic in many situations. (Harmeson-ISWS)
W75-02389

PHYTOPLANKTON IN TWO PONDS IN KATHMANDU VALLEY (NEPAL),
Max-Planck-Institut fuer Limnologie zu Ploen (West Germany).
For primary bibliographic entry see Field 2H.
W75-02402

METHODS FOR MEASURING THE PRIMARY PRODUCTIVITY AND STANDING CROPS OF AN EPIPHYTIC ALGAL COMMUNITY ATTACHED TO SCIRPUS VALIDUS,
Alberta Univ., Edmonton. Dept. of Botany.
M. Hickman, and D. M. Klarer.
Int Rev Gesamten Hydrobiol. Vol 58, No 6, p 893-901. 1973.
Identifiers: Algal communities, Chlorophyll, *Epiphytic algae, Phytoplankton, *Primary productivity, *Scirpus-validus, *Standing crops, Analytical techniques, *Pollutant identification, Scintillation counting.

Methods for the quantitative measurement of primary production, utilizing liquid scintillation counting techniques, and the standing crops utilizing both chlorophyll a content and cell counts of the epiphytic algal community attached to Scirpus validus were described. The techniques enable both the loosely and attached algae to be sample without appreciable loss. Experimental designs demonstrated the accuracy of these procedures, and the components of variance were calculated for these designs. The major source of variation was introduced at the sampling stages due to the inherent heterogeneity of the community. The presence of filamentous algae in the population tended to increase the counting and subsampling errors. The whole method variance had less than the 50% standard error that was suggested as acceptable for phytoplankton population measurements.--Copyright 1974, Biological Abstracts, Inc.
W75-02429

DATA COLLECTION SYSTEMS AND THEIR IMPACT ON THE FUTURE DEVELOPMENT OF HYDROLOGY,
Department of the Environment, Reading (England). Water Data Unit.
For primary bibliographic entry see Field 2A.
W75-02476

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PART 1. NORTH ATLANTIC SLOPE BASINS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-02482

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PARTS 4 AND 5. ST. LAWRENCE RIVER BASIN AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-02483

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-02484

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PARTS 12-16. NORTH PACIFIC SLOPE BASINS, ALASKA, HAWAII, AND OTHER PACIFIC AREAS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-02485

TECHNOLOGY AND ENVIRONMENTAL CONCERNS.
Department of Energy, Mines and Resources, Ottawa (Ontario).
For primary bibliographic entry see Field 5B.
W75-02561

TRANSACTIONAL DYNAMICS OF POULTRY MANURE IN SOIL,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 5C.
W75-02575

SAMPLING DEVICE,
Kaiser Aluminum and Chemical Corp., Oakland, Calif.
P. L. Anderson.
United States Patent 3,823,602. Applied November 20, 1974. Issued July 16, 1974. Official Gazette of the United States Patent Office, Vol 924, No 3, p 485, July, 1974. 1 fig.

Descriptors: *Sampling, *Water sampling, *Patents, *Centrifugation, *Conduits, Equipment, Analytical techniques, Aggregates.
Identifiers: Particulate matter segregation, Particles.

An improved centrifuge sampling device for the capture and size segregation of particles less than two microns in diameter from a fluid has been patented. The device consists of a rotating body and cap which define a spirally shapped conduit having from 1.5 to about 2.5 convolutions. The particulate-laden fluid is split by the sampler into a large stream and a small stream. The large stream is directed to the beginning of the spiral conduit where entrained particles are removed by centrifugal forces. The smaller stream is introduced into the larger stream when nearly all particulate matter has been removed from the larger stream and the flow has become laminar. (Prague-FIRL)
W75-02577

AN AUTOMATED METHOD FOR THE DETERMINATION OF ARSENIC AND ANTIMONY,
New Brunswick Univ., Fredericton. Dept. of Civil Engineering.
Kwok-Tai Kan.
Anal Lett. 6(7): 603-611, Illus. 1973.

Descriptors: *Arsenic, *Antimony, Spectrophotometry.
Identifiers: *Atomic absorption spectrophotometry.

An automated method for determining As and Sb by atomic absorption spectrophotometry based on the evolution of the corresponding hydride by sodium borohydride is reported. This method is rapid and sensitive, and is most suitable for the routine monitoring of the As and Sb levels in surface and ground water, as well as in polluted water.--Copyright 1974, Biological Abstracts, Inc.
W75-02587

GAS CHROMATOGRAPHIC ANALYSIS OF ODORS FROM DAIRY ANIMAL WASTES,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
R. White.
Ph. D. Thesis, Department of Agricultural Engineering, Ohio State University, 1969, 143 p, 36 fig, 23 tab, 61 ref.

Descriptors: *Gas chromatography, *Analysis, *Odor, *Dairy industry, *Farm wastes, Cattle, Waste treatment, Sampling, Measurement, Liquid wastes, Waste storage, Temperature, Hydrogen ion concentration, Aeration, Volatility.
Identifiers: *Malodors, *Odor index peaks, Manures, Dairy manure.

Gas chromatographic analysis was used to analyze the odors from simulated liquid storage of dairy manures. The equilibrium collector, transfer apparatus, and injection apparatus, as developed in this study, functioned to give reliable, repetitive analyses of the head space gas over dairy manures. Eleven odor index peaks were characteristic of untreated dairy wastes. Six of these were identified as hydrogen sulfide, methanethiol, dimethyl sulfide, propyl acetate, and n-butyl acetate. The effect of aeration was to reduce or eliminate the thiol, sulfides, and acetates. The effect of pH and electrode potential had about the same effect as aeration. When calcium hydroxide was added at the beginning of a test a slight reduction in odor was indicated. The apparatus developed has now made it possible to extend study into more comprehensive investigations of odor and management in animal production units. (Russell-East Central)
W75-02591

APPLICATION OF THE A-Z TEST IN INVESTIGATIONS ON THE INFLUENCE OF WOOD INDUSTRY RESIDUES UPON WATER AUTOPURIFICATION PROCESSES, (IN RUMANIAN),
Institutul de Medicina si Farmacia, Iasi (Rumania).
For primary bibliographic entry see Field 5C.
W75-02640

THE USE OF FISH AS SENSORS IN INDUSTRIAL WASTE LINES TO PREVENT FISH KILLS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
J. Cairns, Jr., R. E. Sparks, and W. T. Waller.
Hydrobiologia, Vol 42, p 151-167, 1973. 5 fig, 7 tab, 10 ref.

Descriptors: *Industrial wastes, *Bioindicators, *Monitoring, Waste water(Pollution), Waste water treatment, Biological properties, Fish physiology, Toxicity, Fish, Zinc, Bioassay.

Successful management of stream quality requires in part an ability to predict the biological impact of a number of exogenous factors, including industrial effluents, in order for appropriate corrective procedures to be undertaken. Predictive techniques are suggested to utilize physiological characteristics of fish placed in the interface of industrial waste water and river water to determine sublethal levels to toxicants. The approach first monitors fish movement patterns utilizing the techniques of light beam interruption. Experiments conducted with zinc as a toxicant that changes in movement patterns can be utilized to detect as low a concentration as 3.65-2.93 mg/l for a 96 hour exposure. Monitoring results of fish breathing patterns utilizing polygraph recordings of breathing signals from 52 sunfish in 9 experiments indicate that the lowest zinc concentration detected was 2.55 mg/1, 52 hours after the zinc had been added. Detection of various effluent levels depends upon the statistically defined number of fish which are effected. In choosing this criterion errors are possible. The manager must weigh the risk of not detecting a toxic level against false detection which could close a plant. A number of monitoring designs are presented. (Schroeder-Wisconsin)
W75-02650

THE EFFECT OF LOW VOLUME AND HIGH VOLUME AERATION ON A HOG LAGOON,
North Dakota State Univ., Fargo. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-02668

TWO-TUBE METHOD FOR SCREENING WATER ISOLATES FOR SALMONELLA,
Environmental Protection Agency, Kansas City, Kans. Water Quality Lab.
F. L. Harris.
Environmental Letters, Vol 7, No 1, p 1-13, 1974. 1 fig, 4 tab, 7 ref.

Descriptors: *Salmonella, *Analytical techniques, Testing, Water analysis, Iron, *Pollutant identification.
Identifiers: Two-tube method, Indole, Malonate.

A two-tube Salmonella screening method, Polyvalent H Antiserum, Iron, Indole, Malonate (AIIM), has been devised for the presumptive identification of the Salmonella genus. The identification is made with Salmonella polyvalent H antiserum in a motility medium; Salmonella growth is confined to the stab because of motility inhibition due to the antiserum. Iron, indole, and malonate were used to lessen the possibility of various non-motile organisms and various antigenically related microorganisms being confused with Salmonella. River and waste water isolates along with stock cultures were used to test the method. AIIM was found to be useful for screening water isolates for Salmonella. All the typical Salmonella tested gave appropriate reactions. (Sandoski-FIRL)
W75-02713

PREPARATION OF HAIR FOR LEAD ANALYSIS,
Vanderbilt Univ., Nashville, Tenn. Dept. of Chemistry.
For primary bibliographic entry see Field 5E.
W75-02723

THERMOMETRIC AND CONDUCTOMETRIC OBSERVATION OF COPPER (II) - CATALYZED REACTIONS IN THE CATALYTIC-KINETIC DIFFERENCE METHOD-DETERMINATION OF MICROGRAM AMOUNTS OF COPPER (II),
Freiburg Univ. (West Germany). Chemisches Laboratorium.
S. Pantel, and H. Weisz.
Analytica Chimica Acta, Vol 68, No 2, p 311-316, February, 1974. 5 fig, 2 tab, 7 ref.

Descriptors: *Copper, *Analytical techniques, *Conductivity, *Temperature, Chemical reactions, Oxidation.
Identifiers: Catalytic-kinetic difference method, Difference methods, Catalysis, Thermometry, Conductometry.

The course of reactions in the catalytic-kinetic difference method was followed by conductometry and thermometry. The copper-catalyzed decomposition of hydrogen peroxide was followed by thermometry, and the copper-catalyzed oxidation of thiosulfate with hydrogen peroxide by conductometry. Both reactions were used for determination of microgram amounts of copper (II). Error in the determination of CuII by thermometric difference ranged from - 1.8 to plus 0.6 micrograms in 20 to 70 microgram samples and by conductometric difference from minus 2.0 to plus 0.5 micrograms in 10 to 100 microgram samples. (Jernigan-Vanderbilt)
W75-02726

LABORATORY DIAGNOSIS OF INCREASED LEAD ABSORPTION,
California Univ., Los Angeles. Dept. of Neurology.
For primary bibliographic entry see Field 5C.
W75-02727

THE SEPARATION OF MERCURY FROM SEA WATER BY ADSORPTION COLLOID FLOTATION AND ANALYSIS BY FLAMELESS ATOMIC ABSORPTION,
Hawaii Univ., Honolulu. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-02728

A PRECISE METHOD FOR THE GENERATION OF STANDARD METAL SALT PARTICULATES,
Louisiana State Univ., Baton Rouge. Dept. of Chemistry.
For primary bibliographic entry see Field 8G.
W75-02729

THE DETERMINATION OF COPPER IN SEA WATER BY ATOMIC ABSORPTION SPECTROMETRY WITH A GRAPHITE ATOMIZER AFTER ELUTION FROM CHITOSAN,
Bologna Univ. (Italy). Ciamician Chemical Inst.
For primary bibliographic entry see Field 5B.
W75-02730

THE ATOMIZATION OF METAL CHELATES IN CHLORINATED ORGANIC SOLVENTS IN FLAME SPECTROMETRY,
Ljubljana Univ. (Yugoslavia). Inst. of Chemistry.
S. Gomiscek, and M. Span.
Analytica Chimica Acta, Vol 69, No 1, p 49-57, March, 1974. 7 fig, 1 tab, 16 ref.

Descriptors: *Heavy metals, *Copper, *Magnesium, *Solvents, *Spectroscopy, Chelation, Chlorination, Organic compounds, Analytical techniques, Chlorine, Laboratory tests, *Absorption, Pollutants.
Identifiers: Flame spectrometry, Spectrometry, Hydrocarbons, Atomization.

The results of a study of the influence of organic solvents, with special emphasis on chlorinated hydrocarbons, on the atomization of metal-organic compounds were discussed. The standard solutions of copper and magnesium were measured and added to the organic solvent, a mixture of benzene and carbon tetrachloride. The prepared solution was then sprayed into the flame of an atomic absorption spectrometer. Absorption was measured at different flow rates and heights in the flame. The results showed that chlorine and its compounds play an important role in the atomization of metal chelates in the flame. Increased amounts of chlorine in the solvent first reduced the absorption, which reached a minimum, but then increased again, reaching the starting value at a defined amount of chlorine. (Jernigan-Vanderbilt)
W75-02731

SEPARATION OF IRON (III), COBALT (II) AND NICKEL (II) BY PAPER CHROMATOGRAPHY,
Nagpur Univ. (India). Dept. of Chemistry.
R. B. Kharat, and K. T. A. Kunjamma.
Current Science, Vol 43, No 10, p 310-311, May, 1974. 1 tab, 7 ref.

Descriptors: *Iron, *Cobalt, *Nickel, *Separation techniques, Chromatography, Solvents.
Identifiers: Paper chromatography.

Iron (III), cobalt (II) and nickel (II) were separated by ascending paper chromatography at various conditions using 85.0% acetone, 5.0% con. HI and 10.0% methyl isobutyl ketone as a solvent system. The minimum time required for the separation was 15 minutes. After trying various solvents, it was observed that reasonably good separation could be achieved within 15-30 minutes with a solvent mixture of 85.0% acetone, 5.0% con. HCl and 10.0% methyl isobutyl ketone. The best separation is possible within 45-90 min. (Jernigan-Vanderbilt)
W75-02733

A METHOD FOR THE DETERMINATION OF TOXICITY TO BACTERIA OF POLLUTANTS IN WATER AND EFFLUENT, (IN GERMAN),
Frankfurt Univ. (West Germany). Hygiene-Institut.
For primary bibliographic entry see Field 5C.
W75-02734

DIFFUSION CONTROLLED, THERMAL IONIZATION SOURCE FOR MASS SPECTROMETRIC ANALYSIS OF TRACE METALS,
Combustion Engineering Inc., Windsor, Conn. Nuclear Physics Dept.
J. R. Rec, W. G. Myers, and F. A. White.
Analytical Chemistry, Vol 46, No 9, p 1243-1247, August, 1974. 4 fig, 2 tab, 3 ref.

Descriptors: *Trace metals, *Analytical techniques, *Spectroscopy, Diffusion, Ionization, Nickel, Instrumentation, Testing procedures, *Mass spectrometry, Uranium coatings, Protective coatings.
Identifiers: Plutonium, Rhenium, *Thermal ionization.

Analysis sensitivities achievable with the thermal ionization, mass spectrometric technique for trace quantities of uranium and plutonium are improved by replacement of the commonly employed direct evaporation, single-filament source with a diffusion controlled source. The sample on the single filament surface is coated with a high work function, refractory metal using a R.F. sputtering technique. The arrival of sample atoms at the ionizing surface is controlled by diffusion through the applied coating. Nickel, tungsten, and rhenium coatings were evaluated. Only the rhenium coats were found to be thermally stable, adherent, and visibly defect free. Coated and uncoated uranium and plutonium samples were mass spectrometrically analyzed. The coated samples were at least four times more efficient in sample utilization than the uncoated samples. Analytical sensitivities of at least 1 x 10 to the minus 15th power grams plutonium on the filament were observed with comparable sensitivities estimated by extrapolation for uranium. (Jernigan-Vanderbilt)
W75-02735

DIFFICULTIES IN THE DETERMINATION OF ARSENIC BY ATOMIC ABSORPTION SPECTROMETRY,
Louisiana State Univ., Baton Rouge. Dept. of Chemistry.
J. W. Robinson, R. Garcia, G. Hindman, and P. Slevin.
Analytica Chimica Acta, Vol 69, No 1, p 203-206, March, 1974. 2 fig, 1 tab, 8 ref. EPA (R-800771).

Descriptors: *Arsenic compounds, *Heavy metals, *Analytical techniques, Acids, Aqueous solutions, Air pollution, Spectrophotometry, *Pollutant identification, Chemical analysis.
Identifiers: *Arsenic, Atomic absorption spectrometry.

To calibrate an atomic absorption spectrometer to measure arsenic in the atmosphere arsine gas diluted with clean air was injected into a system with a carbon bed atomizer. Arsine is readily decomposed at temperatures above 230 degrees into arsenic and hydrogen which interferes at wavelengths below 200nm. However, arsine decomposed even at room temperature, so that quantitative data based on the concentration of arsine introduced were unreliable. Formic acid was then used as a solvent because of its low hydrogen content. Solutions of arsenic in formic acid were prepared by dilution of microliter quantities of an aqueous 1000 microgram/ml arsenic stock solution with formic acid. In flame atomizers atomic arsenic could be quickly changed to molecular arsenic with a severe loss in sensitivity. The absorption signal increased with decreased contact with the carbon bed and with a decreased time between atomization and adsorption measurement. The

degree of absorption was temperature dependent according to the presence of varying equilibria among As4, As2, and atomic As. Only under rigidly controlled conditions will reproducible data be obtained. (Jernigan-Vanderbilt)
W75-02737

LEAD IN SEAWATER,
California Inst. of Tech., Pasadena. Div. of Geological and Planetary Sciences.
C. Patterson.
Science, Vol 183, p 553-554, February, 1974.

Descriptors: *Sampling, *Laboratory tests, *Lead, Water pollution, Copper, Cadmium, Baseline studies, Water quality standards, Polarographic analysis, Conferences, *Sea water, *Pollutant identification.
Identifiers: Isotope dilution, Atomic absorption spectrometry.

Analysts from a workshop sponsored by the National Science Foundation agreed at a meeting in September, 1973 that published measurements of thousands of nanograms of Pb per kg in coastal waters may be in gross error. Two of the surface coastal waters studied in this workshop were found to contain about half as much lead as any deep water previously analyzed by isotope dilution methods. Among the recommendations of the workshop were ways of increasing the amount of analyzed sample lead, together with directions for reducing procedural blank lead. A valuable result of the workshop was the development of a reliable method for cleaning containers used for shipping standardized samples of seawater. The difficulties that have been revealed in this study regarding the analysis of lead in seawater by atomic absorption and anodic stripping voltammetry may exist for other metals in seawater, such as copper and cadmium. (Pulliam-Vanderbilt)
W75-02740

A NEW PROCEDURE FOR DETERMINING THE METAL CONTENT OF COLOURLESS COMPLEXONATES,
Leeds Univ. (England). Dept. of Inorganic and Structural Chemistry.
H. M. N. H. Irving, and R. H. Al-Jarrah.
Analytica Chimica Acta, Vol 68, No 2, p 473-474, Feburary, 1974. 3 ref.

Descriptors: *Heavy metals, *Analytical techniques, *Mercury, Chemical reactions, Inorganic compounds, Acids, *Testing procedures, *Pollutant identification, Chemical analysis.
Identifiers: EDTA.

A new procedure for the determination of mercury in its very stable complex with EDTA was discussed. The validity of the procedure was established by treating 5-ml aliquot portions of a mercury (II) salt (1 mg/l) with (1) 15 ml of 0.5M sulfuric acid, (2) 10 ml of 0.5M sulfuric acid, and 5 ml of zirconium sulfate solution (20% excess) in 0.5M sulfuric acid, and (3) 5 ml of EDTA (10% excess) followed by 5 ml of 0.5 M sulfuric acid and 5 ml of the zirconium sulfate solution. Acetic acid (2 ml of 6M) and 5 ml of a 0.001% solution of dithizone in chloroform were then added to each solution and after equilibration the absorbances due to mercury (II) dithizone were measured at 500 nm and found to be 0.604, 0.598 and 0.600 respectively. The procedure for other metals was validated in a similar way. (Jernigan-Vanderbilt)
W75-02744

DIRECT DETERMINATION OF ZINC IN SEA-BOTTOM SEDIMENTS BY CARBON TUBE ATOMIC ABSORPTION SPECTROMETRY,
Gulf South Research Inst., New Orleans, La. Dept. of Analytical Chemistry.
D. V. Brady, J. G. Montalvo, G. Glowacki, and A. Pisciotta.
Analytica Chimica Acta, Vol 70, No 2, p 448-452, June 1974. 3 tab, 1 fig, 8 ref.

Descriptors: *Zinc, Sea water, *Sediments, *Analytical techniques, Sampling, On-site data collections, *Pollutant identification, *Spectrophotometry, Water analysis.
Identifiers: *Atomic absorption spectroscopy, Interferences, Microanalysis.

The use of the flameless atomic absorption technique with the carbon tube for the direct and rapid determination of zinc in sediments was demonstrated with a sample obtained from a Mississippi coastal bay, and results were compared with those obtained using the EPA method. A sample was dried, ground, weighed, made into a slurry, and injected directly into the graphite furnace. Linear calibration curves were obtained for aqueous zinc solutions in the range 3-20 ppb Zn. A calibration curve was also prepared with varying concentrations of zinc in sediment slurries, which were obtained by mixing different weights of sediment in 10 ml of water; the average zinc value of 9.23 ppm was used for calculation. The sediment curve could be super-imposed on the aqueous curve, which indicated that the sediment matrix did not have adverse effect on the zinc recovery. Matrix effects are minimized since only microgram amounts of sediment are used. (Jernigan-Vanderbilt)
W75-02749

EXTRACTION AND ATOMIC-ABSORPTION SPECTROMETRIC DETERMINATION OF TRACE COPPER WITH ZINC DIBENZYLDITHIOCARBAMATE,
Yamaguchi Univ. (Japan). Dept. of Chemistry.
N. Ichinose.
Analytica Chimica Acta, Vol 70, No 1, p 222-226, May 1974. 2 fig, 2 tab, 9 ref.

Descriptors: *Analytical techniques, *Copper, Testing procedures, Absorption, Laboratory tests, *Separation techniques, *Spectrophotometry, *Pollutant identification, Chemical analysis.

Micro amounts of copper were determined by extraction as a copper dibenzyldithiocarbamate (CuDBC) chelate from various acidic media into methyl isobutyl ketone (MIBK), followed by introduction of the extract into an air-acetylene flame. The method is relatively simple and has the advantage of using a fairly wide range of acidities compared to the pyrollidinedithiocarbamate (APDC) or diethyldithiocarbamate (DDC) method. The effects of variation in the air-acetylene flow ratio and the hollow-cathode lamp current on the absorbance of copper were examined at the burner height adjusted for maximal absorption variation of shaking times between 1 and 7 minutes caused no change in the absorbance of copper. Optimum acidity and reagent concentration were determined to give most complete extraction. The copper complex was stable for at least 1 hour. Precision was greater than with the aqueous method. (Jernigan-Vanderbilt)
W75-02750

5B. Sources Of Pollution

SYSTEMIC ARTERIAL DISEASE AND CHRONIC ARSENICISM IN INFANTS,
Universidad Catolica de Chile, Santiago. Dept. of Pathology.
For primary bibliographic entry see Field 5C.
W75-02211

PICKLING PROCESS POLLUTION PROBLEM 'ELIMINATED'.
For primary bibliographic entry see Field 5D.
W75-02212

DETERMINATION OF THE BREAK-THROUGH VOLUME OF SODIUM CHLORIDE FOR SOIL COLUMNS IN PESTICIDE LEACHING,
Uniroyal, Inc., Naugatuck, Conn. Agricultural Chemicals Research and Development.
L. E. Dannals, and N. Kucharczk.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 4, p 348-351, 1974. 1 fig, 1 tab, 2 ref.

Descriptors: *Pesticides, *Leaching, *Soil analysis, Groundwater, *Sodium chloride, Water pollution sources, Measurement, Analytical techniques, Pollutant identification, *Path of pollutants.
Identifiers: Break-through volume, Liquid scintillation, Soil columns, Standardization.

Factors such as column matrix geometry, diffusion, and retardation due to adsorption and ion exchange influence and mobility of any chemical through a soil column. The extent to which pesticides leach in soils is a measure of potential groundwater contamination. This can be commonly determined in soil columns. A highly-leachable substrate such as NaCl is used for standardization to determine the breakthrough volume for every column and soil used. The definition for the break-through volume of sodium chloride is defined as the volume needed to elute 50 percent of the applied salt out of the column. This is determined by 36NaCl and liquid scintillation counting. In this way, column leaching studies become more accurate and intercomparable. (Prague-FIRL)
W75-02230

SOIL PROFILE CONDITIONS OF CATTLE FEEDLOTS,
Agricultural Research Service, Lincoln, Nebr.
L. N. Mielke, N. P. Swanson, and T. M. McCalla.
Journal of Environmental Quality, Vol 3, No 1, p 14-17, 1974. 4 fig, 2 tab, 5 ref.

Descriptors: *Soil profiles, *Feed lots, *Cattle, *Farm wastes, Soils, Water pollution, *Soil contamination, Organic matter, Infiltration, *Path of pollutants, Water pollution sources.
Identifiers: Feedlot surfaces, Layered soils, Interface layer.

To assimilate the potentials for soil and water pollution one must know the conditions and characteristics of the soil. Feedlot surfaces are unique in that the packed layer of organic matter behaves differently than other soils. The profile of feedlot soils can be described as three layers: the organic matter, the interface, and the underlying soil. The profile of the underlying soil of a feedlot has little effect on water movement into the profile or on runoff. The bulk density at the interface layer is greater in a feedlot than in cropland at the same depth. Water movement is impeded because of the compactness and effects on soil particle dispersion. The surface layer of a feed lot may absorb large amounts of water into the soil, but actual infiltration of water into the soil is minimal. When manure is present and covering an interface, nitrate-nitrogen is less likely to accumulate in the profile. (Russell-East Central)
W75-02244

INFLUENCE OF THE CONCENTRATION AND VOLUME OF SALINE WATER ON THE FOOD INTAKE OF SHEEP, AND ON THEIR EXCRETION OF SODIUM AND WATER IN URINE AND FAECES,
Commonwealth Scientific and Industrial Research Organization, Deniliquin (Australia). Riverian Lab.
For primary bibliographic entry see Field 3C.
W75-02271

ORGANIC AND INORGANIC GEOCHEMISTRY OF SOME COASTAL PLAIN RIVERS OF THE SOUTHEASTERN UNITED STATES,
Georgia Inst. of Tech., Atlanta. School of Geophysical Sciences.
For primary bibliographic entry see Field 2K.
W75-02279

CHARACTERISTICS AND COMPARATIVE MAGNITUDE OF NON-POINT SOURCES,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
R. C. Loehr.
Journal Water Pollution Control Federation, Vol 46, No 8, p 1849-1872, 1974. 2 fig, 17 tab, 59 ref.

Descriptors: *Water pollution sources, Water pollution control, Ranges, Precipitation(Atmospheric), Forest watersheds, Agricultural runoff, Farm wastes, Tile drainage, Irrigation effects, Urban runoff, Feed lots, Erosion, Nitrogen, Phosphorus, Sediments, Municipal wastes, Industrial wastes.
Identifiers: *Non-point pollution sources.

Available information on the characteristics and relative magnitude of certain non-point nutrient sources entering surface waters are summarized and the feasibility of controlling these sources is discussed. Diffuse sources are difficult to estimate quantitatively and to control. On the basis of the reported range of characteristics in non-point sources and available technology for their control, the non-point sources were identified as those uncontrollable or not needing control (precipitation, unmanaged forest land runoff, range land runoff), those possibly needing control (cropland runoff, runoff from land receiving manure, cropland tile drainage, irrigation return flows), and those requiring control (urban land runoff, manure seepage, feedlot runoff). Many non-point sources will be difficult to control if control is defined as the ability to establish and enforce effluent standards for a given runoff event. However, if the control is approached by using appropriate management practices, many of the sources are controllable. Proper land and crop management methods, such as erosion control, timing and integration of manure disposal practices on the land, and timing of fertilizer application to coincide closely with crop need, offer opportunities to minimize losses of potential pollutants from agricultural lands. (Jones-Wisconsin)
W75-02292

NUTRIENT LOSSES FROM FERTILIZED GRASSED WATERSHEDS IN WESTERN NORTH CAROLINA,
Tennessee Valley Authority, Muscle Shoals, Ala. Soils and Fertilizer Research Branch.
V. J. Kilmer, J. W. Gilliam, J. F. Lutz, R. T. Joyce, and C. D. Eklund.
Journal of Environmental Quality, Vol 3, No 3, p 214-219, 1974. 1 fig, 7 tab, 29 ref.

Descriptors: *Runoff, *Nutrients, *Fertilizers, *Grasslands, Watersheds(Basins), North Carolina, Drainage, Nitrogen, Phosphorus, Potassium, Sulfur, Seepage, Winter, Spring.

Nutrient loss data in discharge waters from fertilized, steeply sloping grassed watersheds was obtained. Although nitrogen and phosphorus are the plant nutrients of primary interest from a water quality standpoint, K and S losses were also included because of their relationship to crop production. Measured N losses in drainage water from the two watersheds were found to be modest over a 4-year period, amounting from 6 to 10% of that applied in fertilizer. The concentration of nitrate-nitrogen in drainage water accounted for 65% of the nitrate-nitrogen loss from the lightly fertilized watershed; 74% from the heavily fertilized one. Annual P losses were negligible, amounting to 0.15 and 0.27 kg/ha on the two watersheds. Potassium losses averaged 3.99 and 5.83 kg/ha annually, S losses 1.92 and 2.54 kg/ha. Losses of all nutrients were highest during winter and spring due to larger volumes of drainage water carrying higher concentrations of nutrients during these seasons and the absence of actively growing crops. It is concluded that steeply sloping pastures, judiciously fertilized, are not important sources of nutrients occurring in surface and groundwaters. (Jones-Wisconsin)
W75-02294

QUANTITATIVE RELATIONSHIPS OF THE ROTATORIA PLANKTON IN LAKE BALATON DURING 1965-1966,
Magyar Tudomanyos Akademia, Tihany. Biological Research Inst.
For primary bibliographic entry see Field 2H.
W75-02309

COLIFORM BACTERIA IN CHICKEN BROILER HOUSE DUST AND THEIR POSSIBLE RELATIONSHIP TO COLI-SEPTICEMIA,
Saskatchewan Univ., (Saskatoon). Western Coll. of Veterinary Medicine.
H. C. Carlson, and G. R. Whenham.
Avian Diseases, Vol 12, p 297-302, 1968. 1 fig, 15 ref.

Descriptors: *Coliforma, *Bacteria, *Poultry, *Dusts, Stress, Mortality, Humidity, Filters, Sampling, Air pollution.
Identifiers: *Broiler houses, *Coli-septicemia, Air sampling.

This project was initiated to determine any relationship between increasing levels of visible dust in the broiler houses, any increase in total bacteria and coliform counts, and the coli-septicemia condition which appeared in the flocks. Six broiler houses were selected for the air sampling and humidity studies. Four of these were large dirt-floor houses holding approximately 11,000 birds each, while two were small houses with concrete floors capable of holding 5,500 birds. The coliform count began at 0 and then rose steeply, reaching a maximum of approximately 33 organisms per cubic foot of air between 2 1/2 and 3 weeks. The level then dropped sharply to 8 organisms per cubic foot at approximately 6 weeks, when it again began to rise, reaching 30 organisms per cubic foot at nine weeks. The total count began at 0 and rose until about 6 weeks, at which point there was an average of 360,000 organisms per cubic foot. Then it dropped and leveled off at 9 weeks at approximately 200,000 organisms. Various factors (such as vaccination, chilling, overheating, crowding, deficient ventilation, rapid growth, change of feed, and inclement weather) have been suggested as stress factors which could complicate an E. coli infection. (Cartmell-East Central)
W75-02311

SEEPAGE OF FEEDYARD RUNOFF WATER IMPOUNDED IN PLAYAS,
Southwestern Great Plains Research Center, Bushland, Tex.
O. R. Lehman, B. A. Stewart, and A. C. Mathers.
Agricultural Research Service Report MP-944, February 1970. 7 p, 3 fig, 5 tab, 5 ref.

Descriptors: *Agricultural runoff, *Seepage, *Playas, *Feed lots, *Impoundments, Farm wastes, Aquifer, Nitrates, Nitrites, Chlorides, Soil water, Sampling, *Texas, *Path of pollutants, Water pollution sources.
Identifiers: Ammonium.

Research was conducted in a playa at Randall County Feedyards Inc., 10 miles, S.W. of Amarillo, Texas to determine if pollutants from feedyard runoff water seep through playa soil and contaminate groundwater. In August, 1968, a large amount of runoff was impounded in the playa. In March, 1969, soil samples were taken at various sites across the playa at depths from 1 to 13 feet. A second playa 3 miles North was used as a representative of the study playa before impoundment of feedyard runoff. Soil samples were analyzed for nitrite, nitrate, ammonium, chloride, and water content. Concentrations of nitrite, nitrate, ammonium and chloride were found to decrease steadily with depth. The percentage of soil moisture also decreased with depth. Findings suggest that little or no pollutants will seep through the bottom of playas with fine soil texture. The hazard of groundwater pollution may be greatest in smaller deeper playas with sloping, coarse soils immediately surrounding the playa bottom. (Lee-East Central)
W75-02314

THE INFLUENCE OF MANURE SLURRY IRRIGATION ON THE SURVIVAL OF FECAL ORGANISMS IN SCRANTON FINE SAND,
Florida Univ., Gainesville. Dept. of Microbiology.
F. Dazzo, P. Smith, and D. Hubbell.
Journal of Environmental Quality, Vol 2, No 4, p 470-473, October-December, 1973. 2 fig, 2 tab, 20 ref.

Descriptors: *Sprinkler irrigation, *Farm wastes, *Waste disposal, *Salmonella, *Soil contamination, Pathogenic bacteria, Enteric bacteria, Cattle, *Slurries, Path of pollutants, Water pollution.
Identifiers: *Fecal organisms, Scranton fine sand, Fecal coliforms, Health hazard.

The effects were examined of various rates of irrigation of cow manure slurry on the survival of Salmonella enteritides serotype Enteritidis and fecal coliforms within Scranton fine sand. Millet was inoculated with 0, 1.27, 2.54, and 5.08 cm of the cow manure slurry. The numbers of viable enteric organisms were determined at various times after inoculation. It was found the death rate of both groups declined in soil which previously had received manure application. Results indicate several long-term ecological effects of increasing the manure slurry irrigation rates on the receiving soil. The potential danger of health hazards associated with the use of contaminated soil would be expected to increase with increasing rates of application. This study on a pilot scale irrigation system showed that pathogen survival is a problem which should be considered and controlled in the design and operation of a waste treatment process involving sprinkler irrigation on land. (Russell-East Central)
W75-02315

BEEF CATTLE FEEDLOT RUNOFF--PHYSICAL PROPERTIES,
Agricultural Research Service, Lincoln, Nebr.
C. B. Gilbertson, and J. A. Nienaber.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 5, p 997-1001, Sept- Oct, 1973. 3 fig, 7 tab, 13 ref.

Descriptors: *Agricultural runoff, *Feed lots, *Cattle, *Farm wastes, Physical properties, Chemical properties, Sampling, Solid wastes, *Waste treatment, *Water pollution sources.
Identifiers: Runoff control.

Basic information on feedlot runoff is provided for enhancing and simplifying design of runoff control facilities. Three runoff control facilities were constructed and instrumented on feedlots with a capacity of 200 head each. Two additional runoff control facilities were installed with 100-head capacity. Automatic samplers were installed on all sites to obtain composite samples of runoff from the feedlots and of effluent discharged from the debris basins to the holding ponds. Laboratory analyses determined total solids concentration, settleable solids, and nonfiltrable solids. These data may be valuable in calculating detention times and storage capacities for solids settling facility design. The results can also be used to calculate solids accumulations in holding ponds to estimate maintenance requirements. (Cartmell-East Central)

W75-02321

ODOR MEASUREMENT FOR LIVESTOCK FEEDING OPERATIONS,
Texas Agricultural Extension Service, College Station.
For primary bibliographic entry see Field 5A.
W75-02342

CONTROL OF BOD UPSETS IN THE DELAWARE ESTUARY,
Delaware Univ., Newark. Dept. of Chemical Engineering.
M. M. Denn, and R. K. Jain.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-237 999, $4.75 in paper copy, $2.25 in microfiche. Completion Report, November 1974. 87 p, 67 ref. OWRR A-024-DEL(1).

Descriptors: *Long-term planning, *Short-term planning, *Management, *Flow control, *Optimization, Water quality control, Water pollution, *Biochemical oxygen demand, Municipal wastes, Industrial wastes, Chemical wastes, Delaware River, Model studies, Estuaries, Regulation.
Identifiers: *Delaware River estuary, *Estuarine models, Dynamic models.

Short term regulation of effluent BOD levels is studied as a means of maintaining water quality in an estuary following a surge in biochemical oxygen demand. Optimal control theory is used to solve the problem, with the constraint that deviations in effluent BOD from regulated means must average to zero. Optimal solutions are obtained for both a lumped and distributed parameter estuary model, using parameters characteristic of the Delaware estuary. Improvements in water quality using the optimal effluent regulation policy are inadequate to justify implementation.
W75-02347

EFFECT OF POLLUTION ON DISTRIBUTION OF LPP PHYCOVIRUSES IN RELATION TO POLLUTION OF THE CHRISTINA RIVER,
Delaware Univ., Newark. Dept. of Biological Sciences.
M. S. Shane, and W. S. Vincent.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 034, $3.25 in paper copy; $2.25 in microfiche. Completion report, August 1974. 19 p, 6 fig, 2 tab, 20 ref. OWRR A-016-DEL(5).

Descriptors: *Viruses, Aquatic microbiology, Cyanophyta, Bacteria, Algal control, *Delaware, *Path of pollutants, Isolation, Aquatic bacteria, Water pollution effects.
Identifiers: *Christina River(Del), *LPP phycoviruses, Lysogeny, Plectonema boryanum, Hartmanella glebae, Bacillus brevis.

The presence of the LPP phycoviruses in the environment was evaluated with respect to the levels of pollution encountered. The viruses were never found in pristine headwaters of the streams screened for their presence, but were always found associated with increased levels of cultural pollution. A new virus strain, LPP-1D (Delaware), was isolated and characterized as a temperate virus. A soil protozoan capable of acting as a reservoir host for the virus was isolated at the same time. Lysogeny was enhanced by various stress conditions (antibiotics, nitrogen starvation, increased pollution levels, etc.). These observations led to a possible model for the non-blooming nature of Plectonema boryanum, the host alga. Under non-optimal conditions, low population densities of virus and host would survive via lysogenization; in absence of the host, virus could be dispersed by the soil amoeba, Hartmanella glebae, into new environments containing the host. A bacterium was also isolated and later identified as an atypical strain of Bacillus brevis. This isolate was demonstrated to possess lytic activity toward the host alga. This organism may also play a role in the control of the host population density. (Glass-Delaware)
W75-02348

BRUSH CONTROL ALONG AGRICULTURAL DRAINAGE DITCHES: ENVIRONMENTAL SAFETY AND EFFICACY OF HERBICIDE FORMULATIONS,
Purdue Univ., Lafayette, Ind. Dept. of Botany and Plant Pathology.
D. J. Morre.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-237 997, $5.25 in paper copy; $2.25 in microfiche. Indiana Water Resources Research Center, Lafayette, Technical Report No 49, September 1974. 108 p, 24 fig, 21 tab, 71 ref. OWRT A-028-IND(1).

Descriptors: *Brush control, *Herbicides, *Drainage, *Bioassay, *2-4-D, Toxicity, Fishkill, *Pesticide residues, *Path of pollutants, Lethal limit, Water pollution effects, *Environmental effects, Water pollution control, Algae, Fish.
Identifiers: Picloram, Dicamba.

The safety of 2,4-D and related herbicides to man, fish, and aquatic food chain organisms was evaluated. Levels at which aquatic organisms could tolerate the herbicides were determined, and new approaches for evidence as to specific herbicide receptors in fish, algae and mammals were developed. The three herbicides tested, 2,4-D, dicamba, and picloram, had low toxicity for algae and fish at rates up to maximum solubility in water. A herbicide binding assay developed used indoleacetic acid as a model compound with no evidence of specific binding sites with 2,4-D on membranes prepared from unicellular green algae, fish muscle or rat liver. A more sensitive electron microscope assay procedure for herbicide-membrane interaction was also developed with indications that animals and algae lack the biochemical mechanisms required for these organisms to respond to 2,4-D or related herbicides. For brush control along agricultural drainage ditches, 2,4-D alone is of limited effectiveness, Silvex as an ester can not be sprayed directly on the water, and application of dicamba appears to be more effective in spring than in the fall.
W75-02349

THE FATE OF FERTILIZER NUTRIENTS AS RELATED TO WATER QUALITY IN THE NORTH CAROLINA COASTAL PLAIN,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
R. P. Gambrell, J. W. Gilliam, and S. B. Weed.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-238 001, $6.25 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, Report No 93, August 1974. (UNC-WRRI-74-93). 151 p, 23 fig, 5 tab, 79 ref, 8 append. OWRT B-039-NC(2), B-056-NC(1), B-063-NC(2). 14-31-0001-3622, 14-31-0001-3918, 14-31-0001-4111.

Descriptors: *Nitrogen, *Phosphorus, Fertilizers, Nutrients, *Agricultural runoff, Nitrates, Phosphates, *North Carolina, *Path of pollutants, Water pollution sources, Coastal plains, Water quality, Soils, Soil chemistry.
Identifiers: Beaufort County(NC), Lenoir County(NC).

Quantities of nitrogen and phosphorus moving into surface and subsurface waters from cultivated soils of the North Carolina Coastal Plain, as affected by internal drainage, were determined. In a moderately well-drained soil, little denitrification was found; in a poorly drained soil with a high water table, much of the unutilized fertilizer nitrogen was lost from the field through denitrification. Little phosphorus was lost from either location studied except by surface movement with eroded sediments. Application of fertilizer nitrogen (224 kg/ha) resulted in an increase in loss of total nitrogen by surface run-off from both soils. Values were 29 percent for the moderately well-drained soil and 10 percent for the poorly drained soil. Nitrogen lost in surface run-off was almost exclusively organically bound, indicating that fertilizer applications serve to maintain the level of soil organic nitrogen. A 2-year nitrogen budget indicated that about 46 kg of residual nitrate-nitrogen/ha moved annually from moderately well-drained soil by subsurface drainage into nearby surface waters. Tile drainage accounted for about half of this nitrogen movement. Denitrification did not remove significant amounts of residual nitrate from the moderately well-drained soil. About 15 kg of nitrate-nitrogen/ha annually moved from poorly drained soil by subsurface drainage during the two winters. The smaller loss from poorly drained soil resulted from denitrification of residual nitrate in the shallow groundwater. Water management may increase the denitrification of unused soil nitrate and thus reduce the pollution potential. (McJunkin-North Carolina State)
W75-02352

NUTRIENTS AND EUTROPHICATION IN THE PAMLICO RIVER ESTUARY, N.C. 1971-1973,
North Carolina State Univ., Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-02353

THE BIOMASS OF ROTATORIA IN LAKE BALATON,
Magyar Tudomanyos Akademia, Tihany. Biological Research Inst.
For primary bibliographic entry see Field 2H.
W75-02356

STANDARDIZED HARDWARE FOR OIL SPILL CONTAINMENT BOOMS,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
For primary bibliographic entry see Field 8A.
W75-02361

NITROGEN NUTRITION AND YIELD RELATIONS OF NUGAINES WINTER WHEAT,
Washington State Univ., Prosser. Cooperative Extension Service.
For primary bibliographic entry see Field 3F.
W75-02401

NITRATE REDUCTION WITH SUBMERGED DRAINS,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
L. S. Willardson, B. D. Meek, L. B. Grass, G. L. Dickey, and J. W. Bailey.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 15, No 1, p 84-90, January-February, 1972. 2 fig, 2 tab.

Descriptors: *Denitrification, *Anaerobic bacteria, *Water pollution sources, Drainage, Tile drainage, Submergence, *California, Nitrates, Subsurface drains, Drains, Path of pollutants.
Identifiers: *San Joaquin Valley(Calif).

A field experiment has been initiated in the San Joaquin Valley of California to test submergence of drains as a means of denitrification. Laboratory and field experiments have shown that denitrification occurs in saturated soil where there is ample organic carbon for bacterial metabolism and a shortage of oxygen. Denitrification and dilution of high nitrate ground water were accomplished in the field. (Skogerboe-Colorado State)
W75-02412

EFFECT OF OIL REFINERY EFFLUENT ON THE SHALLOW GRAVEL AQUIFER IN ZERQA AREA-JORDAN,
Natural Resources Authority, Amman (Jordan).
U. Mudallal, and I. Najjar.
In: Water for the Human Environment, Volume, II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 248-272, 8 fig, 4 tab, 7 ref.

Descriptors: *Water resources, *Groundwater resources, *Water pollution sources, Aquifers, Hydrogeology, Groundwater, Oil pollution, On-site investigations, Phenols, Chlorides, Bicarbonates, Sodium, Waste disposal, Waste water(Pollution), Effluents.
Identifiers: *Middle East, *Jordan.

The Sukhna Refinery Groundwater Province, one of the largest developed areas in Jordan, uses groundwater for most of its water supplies. Groundwater occurs primarily in a shallow gravel aquifer, the Campanian-Maestrichian chert-limestone aquifer, and the the Turonian limestone aquifer. Principal sources of aquifer recharge are precipitation and runoff. The Jordan Refinery is located within the Groundwater Province. Available data on the hydrochemistry of the shallow gravel aquifer was examined to evaluate the degree of groundwater contamination. Waste effluent from the refinery is discharged into a separating pool where oil is separated and returned for processing. Wastewater discharged from the separating pool into a wadi has high concentrations of hydrogen sulfide, sodium sulfide, sodium hydroxide, phenol, and crude oil. Analysis of groundwater samples showed the wastewater has contaminated the shallow gravel aquifer. It was recommended that the phenolic compounds be effectively treated and wastewater be pumped to an appropriate installation for evaporation. (See also W75-02440) (Humphreys-ISWS)
W75-02455

SOME RESULTS OF THE ACTION OF WARM WATERS FROM THERMAL STATIONS ON THE EMISSARIES,
For primary bibliographic entry see Field 5C.
W75-02463

ACCELERATION OF POLLUTION AND SALINIZATION PROCESSES BY CONVECTION CURRENTS IN AQUIFERS,
Technion--Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
H. Rubin.
In: Water for the Human Environment, Volume III, Technical Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 416-427, 4 fig, 13 ref.

Descriptors: *Water pollution, *Groundwater movement, *Mathematical studies, *Convection, Dispersion, Artificial recharge, Groundwater recharge, Aquifers, Waste water, Equations, *Salinity, Thermocline, Water temperature, Flow, Profiles, Distribution patterns.
Identifiers: Linear stability analysis.

A vertical density gradient in groundwater may lead to convection currents. Such currents accelerate the dispersion of soluted materials in the aquifer. The analysis presented was related to two practical cases: (1) artificial recharge of wastewater, where the salinity of the recharged water is higher than that of the groundwater; and (2) thermal convection. It was found that the flow field stability depends on the magnitude of the modified solute Rayleigh number and the ratio between the lateral and longitudinal steady state dispersivities. The convection currents are associated with very low frequency overstable motions. The dimensions of the convection cells depend on the ratio between the steady state dispersivities. The superposition of the steady horizontal flow and the convection flow demonstrates internal waves in the aquifer. In some situations associated with geothermal activity, groundwater motions are affected by convection currents due to large temperature gradients. In such cases saline hot water is usually located in the deep layers of the aquifer from which salt is transfered to the upper layers. The thermal stability parameters determined are the thermal and modified solute Rayleigh numbers, the ratio between the steady state dispersivities, and the ratio between Prandtl and modified Schmidt numbers. In this case two different kinds of instability are possible: an inception of convective currents associated with very low frequency overstable motions, and 'pure overstability'. Both of these instabilities are connected with the appearance of internal waves in the groundwater aquifer. (See also W75-02440) (Humphreys-ISWS)
W75-02465

THE QUALITY OF SURFACE WATERS IN TEXAS,
Geological Survey, Austin, Tex.
J. Rawson.
Water-Resources Investigations 7-74, July 1974. 73 p, 9 fig, 3 tab, 27 ref.

Descriptors: *Water quality, *Surface waters, *Texas, Dissolved oxygen, Urban runoff, Biochemical oxygen demand, Trace elements, Pesticides, *Path of pollutants, Distribution patterns, Pollutant identification.

The discharge-weighted average concentrations of dissolved solids, chloride, and sulfate for many of the principal streams in Texas are less than 500 mg/liter, 250 mg/liter, and 250 mg/liter, respectively. At 65 of 131 sites on streams that were sampled at least 10 times, the biochemical oxygen demand of at least half the samples exceeded 3.0 mg/liter. At 20 of the sites, the dissolved-oxygen content of at least half the samples was less than 5.0 mg/liter. The higher concentrations of minor elements usually were detected in waters from urban areas, indicating a relation to man's activities. Small amounts of some pesticides are widely distributed in low concentrations. The higher concentrations usually were detected in water from urban areas. Small amounts of some of the pesticides studied are widely distributed in surface waters in Texas. Some of the more widely distributed pesticides were 2,4,5-T at 96 sites, diazinon at 80 sites, 2,4-D at 78 sites, dieldrin at 77 sites, Silvex at 47 sites, DDT at 67 sites, lindane at 59 sites, DDD at 51 sites, DDE at 50 sites, and chlordane at 38 sites. (Knapp-USGS)
W75-02488

PHOSPHORUS, IRON, AND MANGANESE DISTRIBUTION IN SEDIMENT CORES OF SIX WISCONSIN LAKES,
Geological Survey, Tacoma, Wash.
G. C. Bortleson, and G. F. Lee.
Limnology and Oceanography, Vol 19, No 5, p 794-801, September 1974. 2 fig, 4 tab, 17 ref.

Descriptors: *Bottom sediments, Lakes, *Wisconsin, *Phosphorus, *Iron, *Manganese, Water chemistry, Chemical precipitation, Sedimentation, Limnology, Distribution patterns, *Path of pollutants, *Lake sediments.

Depositional patterns of iron, manganese, and phosphorus in one central and five northern Wisconsin lakes range from oligotrophic to eutrophic, primarily from natural causes. One-meter cores from one or more locations within each lake were analyzed. The historical pattern of iron and manganese deposition is closely related to the pattern of phosphorus deposition in most of the cores. Four of the nine cores show a strong positive correlation coefficient between P and Fe and seven between P and Mn. Manganese has more predictive value than iron for determining the concentration of phosphorus in a given core; however, the iron content appears to be the dominant factor in the phosphorus sorptive and retentive capacity of sediments. (Knapp-USGS)
W75-02493

CONTAMINATION OF EFFLUENT WATER BY AUSTRALIA-ANTIGEN, (IN GERMAN),
Staatliches Medizinaluntersuchungsamt, Fulda (West Germany).
H. Horst.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med, Vol 156, No 6, p 551-556, 1973, Illus, English summary.
Identifiers: *Australia-antigen, Effluents, Water pollution, Sewage systems, Epidemiology, Public health.

Considerable quantities of material which carry Australia-antigen can enter a city sewage system. Some epidemiological implications of this are discussed.--Copyright 1973, Biological Abstracts, Inc.
W75-02506

GROUNDWATER RESOURCES AND POTENTIAL SEWAGE POLLUTION IN SOUTHERN SPOKANE COUNTY,
Eastern Washington State Coll., Cheney. Dept. of Geology.
E. H. Gilmore, and M. Bacon.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 028. Completion Report, September 30, 1974. 58 p, 8 fig, 1 tab, 27 ref, append. OWRR A-062-WASH(1).

Descriptors: Basalts, Aquifers, Groundwater, Water pollution sources, Bacteria, Recharge, *Washington, Sewage, Withdrawal, Water wells, *Coliforms, *Streptococcus, *Pseudomonas, *Aerobic bacteria.
Identifiers: *Spokane County(Wash).

Most of the groundwater withdrawal in the study area of southern Spokane County is derived from wells that penetrate five basalt interflow aquifers. These aquifers consist of the weathered and fractured upper and lower portions of the basalt flows as well as permeable interflow sediments when present. Several of these aquifers extend throughout most of the study area. In uncased wells the continual flowing of water down hole from upper aquifers to the lower aquifers has reduced the quantity of water in the upper aquifers. This condition has caused several home owners to deepen existing wells and will require more wells to be deepened in the future. Water samples from ponds, shallow and deep wells, shallow bore holes in meadows, and a municipal sewage lagoon system located in the study area were tested for fecal coliforms (FC), total coliforms (TC), fecal streptococci (FS), and asparagin-sufficient, oxidase-positive Pseudomonas spp. (ASP). FC, TC, and FS counts for the pond samples were low and apparently derived from non-human sources. Higher counts occurred in the bore holes. For both shallow and deep wells, little or no immediate fecal pollution was shown, but potential pollution by fecal bacteria may be indicated by the presence of ASP in 80 percent of the samples.
W75-02509

CONCENTRATION OF SOME METALS IN ALGAE FROM THE SEA OF JAPAN (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Geokhimii i Analiticheskoi Khimii.
L. N. Gryzhankova, G. N. Saenko, A. V. Karyakin, and N. V. Laktionova.
Okeanologiya, Vol 13, No 2, p 259-263, 1973. English summary.

Descriptors: *Metals, *Algae.
Identifiers: Agarum cribosum, Chorda filum, Chordaria magellanica, Chromium, Cobalt, Coc-

cophora langsdorfii, Codium, Copper, Dictyota dichotoma, Enteromorpha, Iron, Manganese, Nickel, Pelvetia wrightii, Sargassum, Miyabei, Sargassum pallidum, Tichocarpus crinitus, Titanium, Ulva fenestrata, Vanadium, Sea of Japan.

The concentration of the poly .alent metals Fe, Mn, Cu, Ni, Co, Ti, V, Cr was studied in 12 algae species (Tichocarpus crinitus, Coccophora langsdorfii, Chorda filum, Dictyota dichotoma, Sargassum miyabei, Pelvetia wrightii, Chordaria magellanica, Ulva fenestrata, Codium spp., Agarum cribrosum, Enteromorpha sp., S. palidum) from the Sea of Japan. The studies were carried out with the aid of the 36-channel quantometer. Computation was made of the bases for the standards of red, brown and green algae. The results of the analyses were processed statistically. Iron concentration in brown and green algae is determined to be n . 10-2%, that of Mn, Ni and Ti n . 10-3% and Cu, Co and Cr n . 10-4%, computations being made relative to dry weight. Agarum cribrosum of the brown algae and Enteromorpha sp. of the green algae are the strongest concentrators of polyvalent metals. Air bulbs of Sargassum palidum are the richest in metals as compared to other parts of the algae.--Copyright 1974, Biological Abstracts, Inc.
W75-02541

FOOL'S GOLD POLLUTES,
West Virginia Univ., Morgantown.
W. M. Aston.
Canadian Mining Journal, Vol 95, No 3, p 59-61, March, 1974.

Descriptors: *Water pollution sources, *Mine drainage, Metals, Mining, Pollution abatement, Neutralization, Reverse osmosis, West Virginia, Appalachian Mountain region, Mining wastes, *Acid mine water, Iron compounds, *Pyrite, Mine acids, Iron bacteria, Ferrobacillus, Thiobacillus ferrooxidans, Fool's gold, Iron pyrite.

One of the most severe water pollution problems facing West Virginia, Appalachia, and other coal or base metal mining areas is acid mine drainage. The causes of this pollution source are explained and the scope of the problem discussed. Abatement techniques such as neutralization and reverse osmosis are described. (Sandoski-FIRL)
W75-02556

TECHNOLOGY AND ENVIRONMENTAL CONCERNS.
Department of Energy, Mines and Resources, Ottawa (Ontario).
Annual Report 1972-1973. 9 p.

Descriptors: *Reviews, Automation, Surveys, Instrumentation technology, Environmental control, Metallurgy, Mining, Safety, Analytical techniques, Remote sensing, Application methods, Pollution abatement, Geologic investigations, Energy, Waste treatment, Ice, Canada, Air pollution, Water pollution, *Industrial wastes, Mine wastes, Coal mine wastes, Waste treatment.

A large share of the research carried out by the Department of Energy, Mines, and Resources is aimed at increasing the level of technological effectiveness in Canada. Because of the mandate in the field of non-renewable resources, such research is concerned chiefly with mine safety, the concentration and beneficiation of ores, the processing of fuels to a marketable state, metallurgy, methodology, and instrumentation used in various geologic, geophysic, and topographic surveys. This annual review discusses such topics. (Sandoski-FIRL)
W75-02561

CHEMICAL COMPONENTS AND ESTIMATED DIGESTIBILITY OF DEHYDRATED CATTLE MANURE,
Bureau of Reclamation, Grand Junction, Colo.
C. W. Berg, G. L. Pratt, M. L. Buchanan, and D. O. Erickson.
Paper No 73-4530 presented at the 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973, 13 p. 7 fig, 4 tab, 4 ref.

Descriptors: *Farm wastes, *Dehydration, *Chemical properties, Temperature, Moisture content, Sampling, Silica, Lignins, Wastes, Chemical analysis.
Identifiers: *Manure, Digestibility, Mineral content, Fiber, Cattle manure, Dehydrated manure.

Beef cattle manure samples were dried at 100, 150, or 200F. At each temperature, samples were dried to final moisture contents of 14, 8, and 1 percent. Storage time was evaluated by varying the number of days that elapsed between cleaning operations in the barn. These intervals were 1, 2, 3, and 4 days. The manure still contained about 20 to 25 percent estimated digestible dry matter. The mineral content of the manure was higher than the ration. Increasing the drying temperature from 100 to 200F, resulted in an increase in fiber, lignin and silica and a reduction in digestibility. There were little differences in chemical composition or digestibility of manure dried at 14 percent versus 8 percent, but 1 percent increased silica, fiber and lignin. Protein content decreased in the manure dried to 8 percent compared with that of 14 percent. Protein was reduced with time in storage in the pit. (Cartmell-East Central)
W75-02574

A CHARACTERIZATION OF RADIOACTIVE CONTAMINATION OF THE VISTULA RIVER, (IN POLISH),
Polish Association of Sanitary Engineering and Technology, Warsaw.
J. Kwapinski.
Gaz Woda Tech Sanit. 47(9): 302-305, Illus. 1973.

Descriptors: *Radioisotopes, Vistula River, Rivers, Poland.
Identifiers: Czarna Wiselka, Biala Wiselka.

Studies of radioactivity of river waters indicate that the level of contamination varies, and depends upon the amount of precipitation, flow of water, and content of suspensions. Methods of radioactivity measurements of Vistula River waters (Poland) are described, and results are presented in tabular form. Water of the Czarna Wiselka and Biala Wiselka showed the highest average radioactive contamination. The level of radioactive contamination of the Vistula River depends upon the contamination level of precipitation.--Copyright 1974, Biological Abstracts, Inc.
W75-02582

SURVEY ON WATER POLLUTION IN KOREA, (IN KOREAN),
Institute of Plant Environment, Suwon (Republic of Korea).
For primary bibliographic entry see Field 5C.
W75-02586

HOUSING AND SHELTER FOR FEEDLOT CATTLE,
Minnesota Univ., St. Paul.
For primary bibliographic entry see Field 5E.
W75-02589

A FEEDLOT WITHOUT WASTE,
For primary bibliographic entry see Field 5D.
W75-02590

MERCURY AND ORGANOCHLORINE RESIDUE ANALYSIS OF FISH AND AQUATIC MAMMALS,
Freshwater Fisheries Lab., Pitlochry (Scotland).
A. V. Holden.
Pestic Sci. 4(3): 399-408, 1973.

Descriptors: Aquatic animals, *Fish, *Mercury, *Gas chromatography, *Spectrophotometry, Chlorine compounds, Pesticides, Contaminants, *Pollutants, Industrial wastes, Analysis.
Identifiers: Flameless atomic absorption, Spectrophotometry.

Analyses of fish for Hg, as both methyl Hg and total Hg, and necessary in view of the relatively high concentrations found as compared with most foodstuffs. Gas chromatography and flameless atomic absorption spectrophotometry are the most commonly-used techniques, and versions of these methods are described. Organochlorine residues, of both pesticide and industrial origin, are of considerable ecological interest as the result of food-chain magnification, and the techniques for their analysis in aquatic species, and problems arising from other contaminants are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-02594

A BENTHIC STUDY OF THE AVON SPRING STREAM, CHRISTCHURCH,
Canterbury Univ., Christchurch (New Zealand). Dept. of Zoology.
For primary bibliographic entry see Field 2I.
W75-02606

THE FLUX OF WATER AND NUTRIENTS TO THE GROUND WATER UNDER TO FIELD-TO-FOREST SERE,
Brookhaven National Lab., Upton, N.Y.
J. Ballard, and G. M. Woodwell.
Available from the National Technical Information Service, Springfield, Va 22161 as BNL-18295, $4.00 in paper copy, $2.25 in microfiche. Report, 1973. 1 tab, 3 fig, 6 ref.

Descriptors: *Succession, *Nutrient removal, Ecosystems, Environmental effects, Nutrients, Nitrogen compounds, Percolation, Leaching, Groundwater.
Identifiers: Long Island(NY), Field-to-forest sere.

Results of a study of water and major nutrient movement through the field-to-forest sere of central Long Island are summarized. Ecological theory suggests that the efficiency of trapping and recirculating in natural systems is a function of successional maturity; the more mature communities are more efficient. Data from the study indicates that the theory is essentially correct. Forest lands held nutrients tightly while agricultural lands were leaky. Total percolation of water from terrestrial ecosystems was found to decrease with successional maturity. The nutrient content of this percolation also declined as succession proceeded. Both act together to dramatically reduce total amounts of elements leaving mature ecosystems. Succession resulted in a reduction of calcium output by a factor of six and nitrate-nitrogen by a factor of 10. (Schroeder-Wisconsin)
W75-02612

POTASSIUM SOURCES IN THE MIDDLE PARANA AND LOWER PARAGUAY RIVERS,
Instituto Nacional de Limnologia, Santo Tome (Argentina).
Roque E. Maglianesi.
Physis(B Aires). Vol 31, No 83, p 363-372. 1972. Illus. English summary.
Identifiers: *Argentina(Paraguay River), *Potassium, Rivers, *Path of pollutants, *Argentina(Panama River), Water pollution sources.

The upper Parana, lower Paraguay, Bermejo, middle Parana and its main tributaries to the Santa Fe-Parana stretch (Argentina) are characterized by their respective K content. The upper Parana contains 46.6%; the Bermejo River 2.75%; 3.85% is given by other sources in the lower Paraguay, between Formosa and Puerto Las Palmas, 1.2% by the right affluents of middle Parana and 5.2% by

the left ones. The rank of the instantaneous values of K concentration in the same stretch would be: upper Parana 24-80%, lower Paraguay (at Puerto Las Palmas) 20-71%; and tributaries of both sides of the middle Parana 0-44.6%. Besides, it is settled that the main K contribution supplied by the Bermejo to the lower Paraguay would have to be liberated by the suspended clay minerals.--Copyright 1973, Biological Abstracts, Inc.
W75-02643

FECAL POLLUTION OF MARINE WATER, (IN RUMANIAN),
Institutul de Medicina si Farmacie, Bucharest (Rumania).
For primary bibliographic entry see Field 5C.
W75-02654

THE EFFECT OF LOW VOLUME AND HIGH VOLUME AERATION ON A HOG LAGOON,
North Dakota State Univ., Fargo. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-02668

COMPUTER SIMULATION OF SOLUTE CONCENTRATIONS AND LOADS IN STREAMS,
Geological Survey, Reston, Va.
T. D. Steele.
In: River and Estuary Model Analysis; Vol 3 of Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, January 9-12, 1973, Bangkok, Thailand: Asian Institute of Technology, Bangkok, p 383-400, 1973. 1 fig, 4 tab, 11 ref.

Descriptors: *Simulation analysis, *Solutes, *Water quality, *Mathematical models, Conferences, Path of pollutants, Sampling, Data processing, Model studies, Regression analysis, Statistical models.

A computer simulation technique is proposed as an alternative to continued detailed collection of field samples and laboratory data on concentrations of major inorganic solutes and of dissolved solids in streams. Application of the technique involves using regression relationships between solute concentrations and specific conductance. Specific conductance frequently serves as an overall index of streamflow chemical quality and must continue to be measured at a site for computing extreme and average solute concentrations and loads. Using split-sampling techniques, a part of the available historical data is used to derive the regression parameters, and the remainder is reserved for independent testing of the simulation approach. Selected results of three case studies are presented and both the benfits and limitations of the computer simulation approach are discussed. (Knapp-USGS)
W75-02677

HANDLING, PREPARATION, AND APPLICATION OF POLYELECTROLYTES,
For primary bibliographic entry see Field 5D.
W75-02700

NITROGEN MOVEMENT RESULTING FROM SURFACE APPLICATION OF LIQUID SEWAGE SLUDGE,
Georgia Agricultural Experimental Station, Athens.
L. D. King, and H. D. Morris.
Journal of Environmental Quality, Vol 3, No 3, p 238-243, July-September, 1974. 5 fig, 6 tab, 15 ref.

Descriptors: *Sewage disposal, *Crop production, *Denitrification, Leaching, Nitrogen, Sewage sludge, Sludge, Liquid wastes, *Fertilizers, Agricultural chemicals, Nutrients, Nitrogen compounds, Nitrates, Bermuda grass.
Identifiers: *Soil application, *Land disposal, Grass, Nitrate leaching, NH3 volatilization, Volatilization.

There is increased interest in applying liquid sewage sludge to soil both as a disposal method and as a method to increase crop production. One of the limiting factors on the rate at which sewage sludge can be applied to soil is the speed at which inorganic N is formed and the fate of that inorganic N. A greenhouse lysimeter study was initiated in order to quantify some of the sinks into which nitrogen from sludge applications might move. It was found that NH4-N in the liquid fraction of the sludge was susceptible to volatilization, more so on bare soil than on sod. Leaching losses of NO3-N were increased by increasing water rates and decreased by the presence of grass. A treatment imposed in an effort to increase denitrification, did not reduce leaching loss of NO3-N. (Prague-FIRL)
W75-02701

RETURN IRRIGATION WATER IN HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
R. H. F. Young, and C. Lao.
Water Resources Bulletin, Vol 9, No 3, p 538-555, June 1973. 12 fig, 1 tab, 10 ref.

Descriptors: *Water pollution sources, *Nutrient removal, *Fertilizers, Nitrates, Nitrogen, Groundwater, *Hawaii, Sulfates, Domestic water, *Return flow, Potable water, Irrigation water.

Interest in irrigation return water in the Hawaiian Islands has had stimulus from problems in water quality control encountered by the city and county of Honolulu. Water quality changes in the basal lens overlain by sugarcane fields were monitored. This water is used for domestic supply. The presence of irrigation return water in the basal lenses was evident. Fertilizer components leach into the lenses from agricultural fields. Since this water is used for drinking purposes further studies should be conducted. (Skogerboe-Colorado State)
W75-02710

SEA SEDIMENTS, COSMIC RAYS, AND PULSARS,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
J. C. Higdon, and R. E. Lingenfelter.
Nature, Vol 246, No 5433, p 403-405, December 14, 1973. 1 fig, 18 ref.

Descriptors: *Sediments, *Beryllium, *Aluminum, *Radioisotopes, Water pollution sources, Metals, Oceans, Sedimentation, Sedimentation rates, Fallout, Atmospheric physics.
Identifiers: Cosmic rays, Pulsars, Sea sediments, Supernova explosions, Novas.

Measured variations in 10Be and 26Al in deep sea sediments may result from increases in the local cosmic ray intensities produced by a nearby supernova explosion. 10Be and 26Al are the principal long-lived radioisotopes produced by cosmic rays in the atmosphere. They are quickly precipitated from the atmosphere; however, their latitude dependent production rates are destroyed by ocean current mixing. The production rate of these isotopes as a function of time in the past can be related to their present activity as a function of depth. From measurements of the activity of the two radioisotopes, the sedimentation rate was determined. The production rates showed a rough constancy for the last one to two million years, preceded by a significant increase approximately 1.4 to 3.5 million years ago. Possibilities that this increase was due either to mixing of recent material to depth or a decrease in the sedimentation rate were ruled out. The increase was probably then due to an increase in the global-averaged cosmic ray intensity, as could be expected from nearby supernova explosions. Pulsar ages were studied, and three-dimensional diffusion from one of them could have caused the increase. (Pulliam-Vanderbilt)
W75-02724

ENVIRONMENTAL CONTRASTS: BLOOD LEAD LEVELS OF CHILDREN IN HONOLULU AND NEWARK,
New Jersey Coll. of Medicine and Dentistry, Newark. Dept. of Preventive Medicine and Community Health.
For primary bibliographic entry see Field 5C.
W75-02725

THE SEPARATION OF MERCURY FROM SEA WATER BY ADSORPTION COLLOID FLOTATION AND ANALYSIS BY FLAMELESS ATOMIC ABSORPTION,
Hawaii Univ., Honolulu. Dept. of Chemistry.
D. Voyce, and H. Zeitlin.
Analytica Chimica Acta, Vol 69, No 1, p 27-34, 1974. 3 tab, 19 ref.

Descriptors: *Mercury, *Sea water, *Separation techniques, *Spatial distribution, Adsorption, Flotation, Analytical techniques, Spectroscopy, Sampling, Inorganic compounds, Pollutants, Heavy metals, Metals, Water pollution sources.
Identifiers: *Adsorption colloid flotation, Atomic absorption spectroscopy, Flameless atomic absorption.

Adsorption colloid flotation was found capable of separating ionic mercury from sea water quantitatively at levels as low as 0.02 micrograms/l with the use of a cadmium sulfide collector and octadecyltrimethylammonium chloride as the surfactant. The mercury in 25 samples was separated in two hours. Following the separation the mercury was analyzed by flameless atomic absorption. Recovery of mercury from 0.5 l samples spiked with 0.01 microgram of inorganic mercury gave 0.014 plus or minus 0.002 microgram/0.5 l. Black Point, Oahu near-shore sea water was found to contain mercury in the range 0.038-0.078 microgram/l with no measurable organic mercury fraction. Sea-water samples collected at an open ocean station analyzed for total mercury revealed the highest mercury concentrations above 200 meters. Mercury concentrations in general showed a decreasing trend with increase in depth. (Jernigan-Vanderbilt)
W75-02728

A PRECISE METHOD FOR THE GENERATION OF STANDARD METAL SALT PARTICULATES,
Louisiana State Univ., Baton Rouge. Dept. of Chemistry.
For primary bibliographic entry see Field 8G.
W75-02729

THE DETERMINATION OF COPPER IN SEA WATER BY ATOMIC ABSORPTION SPECTROMETRY WITH A GRAPHITE ATOMIZER AFTER ELUTION FROM CHITOSAN,
Bologna Univ. (Italy). Ciamician Chemical Inst.
R. A. A. Muzzarelli, and R. Rocchetti.
Analytica Chimica Acta, Vol 69, No 1, p 35-42, March, 1974. 3 tab, 1 fig, 23 ref. Natl. Res. Council of Italy (To/01602/22) Intl. AEA (895/R2/RB).

Descriptors: *Copper, *Sea water, *Resins, *Separation techniques, Analytical techniques, Spectroscopy, Instrumentation, Sampling, On-site data collections, Pollutants, Absorption, Industrial wastes, Canneries, Chelation, Europe, Polymers.
Identifiers: *Chitosan, Spectrometry, Atomic absorption spectrometry, Adriatic Sea, Italy, Elution.

Copper in sea water was determined by passing 1 liter of persulphate-pretreated sea water through a 30 x 3 mm chitosan column, and eluting with 20 ml

of a 1% solution of 1, 10-phenanthroline, or with 20 ml of 1 m sulphuric acid. Copper was determined in the eluates by hot graphite atomic absorption spectrometry. The result for the Adriatic sea water was 6.06 plus or minus 0.56 micrograms Cu/l. Diethylaminoethylcellulose, p-aminobenzylcellulose and Dowex A-100 were also tested; Dowex A-100 collected only a minor part of the copper present in sea water. (Jernigan-Vanderbilt)
W75-02730

DIFFUSION CONTROLLED, THERMAL IONIZATION SOURCE FOR MASS SPECTROMETRIC ANALYSIS OF TRACE METALS,
Combustion Engineering Inc., Windsor, Conn. Nuclear Physics Dept.
For primary bibliographic entry see Field 5A.
W75-02735

HEALTH ASPECTS OF ARSENICALS IN THE ENVIRONMENT,
Environmental Protection Agency, Chamblee, Ga. Office of Pesticides Programs.
F. S. Lisella, K. R. Long, and H. G. Scott.
Journal of Environmental Health, Vol 34, No 5, p 511-518, March/April 1972. 1 tab, 25 ref.

Descriptors: *Arsenic compounds, *Toxicity, *Public health, Human pathology, Analytical techniques, Spectroscopy, Water pollution sources, Water pollution effects, Path of pollutants.

Man comes in contact with the arsenicals in a variety of ways. The degree of exposure may be related to a person's occupation, the proximity to a copper smelter, the nature of foods consumed, the type of soil in the area, the type of arsenical ingested or applied for medicinal purposes, and other factors. Arsenicals may be absorbed by inhalation, ingestion, and through the skin. When applied in concentrated form to the skin, arsenic may cause a stinging, burning pain. The inhalation of arsenic dust may result in peforation of the nasal septum. In some poisoned individuals the toxicologic picture may be dominated by gastrointestinal disturbances; in others nervous manifestations may occur. Systematically, arsenic relaxes the capillaries and increases their permeability. This dilation in turn introduces changes in the circulation that cause disturbances in organic function. Arsenic apparently binds organic sulfhydryl groups thus inhibiting a number of enzymes, notably pyruvate oxidose and the phosphates so that tissue respiration is reduced. Also, the formation of arsenious acid aids in the destruction of tissues. (Jernigan-Vanderbilt)
W75-02736

THE ACCUMULATION OF ZN-65 AND OTHER RADIONUCLIDES BY TUBIFICID WORMS,
South Carolina Univ., Columbia. Belle W. Baruch Coastal Research Inst.
J. M. Dean.
Hydrobiologia, Vol 45, No 1, p 33-38, July, 1974. 1 fig, 1 tab, 13 ref. AEC(AT(45-1)-1830).

Descriptors: *Absorption, *Zinc, *Radioisotopes, *Tubificids, *Worms, Freshwater, Sediments, Water pollution sources, Water pollution effects.

Freshwater tubificidae were exposed to Zn-65 and other radionuclides in water and/or on sediments. The worms readily accumulated radionuclides from water but did not accumulate measureable amounts of radionuclides that were bound to sediments. Dissolved radionuclides were concentrated by tubificidae from the water, either by physical or biological mechanisms. The level to which Zn-65 was accumulated was a result of its concentration in the water and of the temperature of the environment. (Jernigan-Vanderbilt)
W75-02746

COMPLEXATION OF IRON (II) BY ORGANIC MATTER AND ITS EFFECT ON IRON (II) OXYGENATION,
Notre Dame Univ., Ind. Dept. of Civil Engineering.
T. L. Theis, and P. C. Singer.
Environmental Science and Technology, Vol 8, No 6, p 569-573, June, 1974. 6 fig, 3 tab, 21 ref. EPA(5-F1-WP-26,602-02).

Descriptors: *Solubility, *Iron, *Organic matter, *Oxidation, Aerobic conditions, Acids, Analytical techniques, Polarographic analysis, Humus, *Oxygenation, Water pollution sources.
Identifiers: Complexation.

An investigation was made to explain the mode of inhibition of Fe(II) oxidation by oxygen in the presence of dissolved organic species of humic origins, and to present a more complete picture of the behavior of iron under oxidizing conditions in natural waters. Iron, in both the ferrous and ferric forms, remains dissolved in an aqueous environment by dissolved organic matter in amounts in excess of that predicted by simple thermodynamic and kinetic considerations. Ferrous iron was capable of forming complexes with organic matter, and as such, was resistant to oxidation even in the presence of dissolved oxygen. The relative strength of such complexes was illustrated by the ferrous-tannate complex that has a stability constant of approximately 10000. A model is presented describing the complexation and oxidation-reduction behavior of aqueous iron in aerobic systems in the presence of organic matter. (Jernigan-Vanderbilt)
W75-02747

5C. Effects Of Pollution

PHOSPHATE REMOVAL BY ALGAL SYSTEMS,
New Mexico Univ., Albuquerque. Dept. of Chemistry.
For primary bibliographic entry see Field 5G.
W75-02208

SYSTEMIC ARTERIAL DISEASE AND CHRONIC ARSENICISM IN INFANTS,
Universidad Catolica de Chile, Santiago. Dept. of Pathology.
H. G. Rosenberg.
Archives of Pathology, Vol 97, No 6, p 360-365, June, 1974. 7 fig, 3 tab, 21 ref.

Descriptors: *Human pathology, *Toxicity, *Potable water, *Arsenic compounds, Public health, *Water pollution, Source of pollutants, Pollutants, Pollutant identification.
Identifiers: *Arterial disease, *Chronic arsenicism, *Arsenicism.

The antecedent of chronic arsenic poisoning from drinking water was found in five cases at the time of autopsy. In all of them a peculiar vascular lesion was found, consisting of intimal thickening in small and medium-sized arteries. The most frequently involved organs were the heart, gastrointestinal tract, liver, skin, and pancreas. The vascular lesions is considered to be characteristic and readily recognized. The great majority of the lesions found at autopsy were considered to be secondary to the vascular damage; others, although related to arsenic poisoning, were dependent on different pathogenic mechanisms. (Sandoski-FIRL)
W75-02211

STRUCTURE AND FUNCTIONING OF ESTUARINE ECOSYSTEMS EXPOSED TO TREATED SEWAGE WASTES, III. 1971-1972,
North Carolina Univ., Morehead City. Inst. of Marine Sciences.
E. J. Kuenzler, A. F. Chestnut, and C. M. Weiss.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11040, $7.50 in paper copy, $2.25 in microfiche. Sea Grant Publication UNC-SG-73-10, March 1973. 225 p, 70 fig, 38 tab, 204 ref. NOAA 2-35178.

Descriptors: *Estuaries, Fertilization, Brackish water, Ponds, Oxidation lagoons, Cytological studies, Biochemistry, Plankton, Dissolved oxygen, Bacteria, Coliforms, Shellfish, Aquiculture, Niches, Nutrients, Salt marshes, Population, Fish, North Carolina, Birds, Bibliographies, Shrimp, Food chains, Oysters, Nitrogen fixation, Ammonia.
Identifiers: Morehead City(NC), Monodus, Foraminifera, Corophium, Littorina irrorata.

This is the fifth report of investigations of the ecological systems which develop in small brackish-water ponds enriched with domestic sewage which had received secondary treatment. Three control ponds received a constant water flow from Bogue Sound diluted with tap water to reduce salinity. Three waste ponds received an intermittent flow of water from Calico Creek mixed with some of the effleunt from the Morehead City sewage treatment plant. Seventeen papers deal with various aspects of the ponds as follows: Cytological and biochemical studies were made on Monodus from treated sewage ponds. Plankton movement in waste and control ponds was studied. Bacteria were identified. Treated sewage fed ponds for growing edible shellfish will require a depuration system to reduce coliform contamination. Formaniferal faunas are described. Micro-infaunal populations, fishes and birds are discussed. A bibliography, ecological requirements for shrimp culture, and a shrimp culture feasibility study are given. A C-14 tracer study was made of a simple marine food chain with application to pond aquaculture. Variations in conditions of oysters; and nitrogen fixation and ammonia diffusion are presented. (Jones-Wisconsin)
W75-02254

ROCKY-SHORE ALGAE IN THE OREGRUND ARCHIPELAGO,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
M. Waern.
Acta Phytogeographica Suecica, Vol 30, 1972. 298 p, 119 fig, 32 plates, 629 ref.

Descriptors: *Marine algae, *Rocks, *Shores, *Distribution, Systematics, Chlorophyta, Chrysophyta, Phaeophyta, Vegetation, Reefs, Benthic flora.
Identifiers: *Oregrund Archipelago(Sweden), Baltic Sea, Bothnian Sea.

Taxonomic and ecologic views on the rocky-shore algal flora at parts of the Baltic coasts of Sweden--more precisely the Oregrund Archipelago are offered. Species belonging to the four groups of Chlorophyceae, Chrysophyceae, Phaeophyceae and Rhodophyceae are discussed. The investigation area forms a right-angled sector in a circle, if the compass point is placed out in the Bothnian Sea 5-1/2 nautical miles north of the Grundkallen Lightship and a circular arc is described from the Bjorn Lighthouse at the northeastern corner of Uppland along the coastline over the islands of Tvarno and Singo out into the Aland Sea just north of Grisslehamn on Vaddo. The submarine archipelago covered with algae reaches even further, across the Grundkallengraund (shallows) to 2/3 of the sector radius, i.e., 19 nautical miles. The zonation of the vegetation is divided into the geolittoral, the hydrolittoral, and the sublittoral. The list of species with notes on taxonomy and ecology are included. There is a compilation of profiles and descriptions of algal growths obtained mainly by diving to serve as a catalogue of the particular vegetation noted in a few selected localities in the Oregrund Archipelago, principally among the skerries. (Jones-Wisconsin)
W75-02257

BIOLOGICAL FIELD AND LABORATORY METHODS FOR MEASURING THE QUALITY OF SURFACE WATERS AND EFFLUENTS.
National Environmental Research Center, Cincinnati, Ohio. Analytical Quality Control Lab.
For primary bibliographic entry see Field 5A.
W75-02258

BIOLOGY AND ECOLOGY OF PLANKTON AND ICE ORGANISMS IN COASTAL WATERS NEAR BARROW, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
R. A. Horner.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-770 155, $4.75 in paper copy, $2.25 in microfiche. Report November 1973. 78 p, 8 fig, 6 tab, 16 ref.

Descriptors: *Biological communities, *Aquatic microorganisms, *Sea ice, *Primary productivity, Plankton, Coasts, Alaska, Chlorophyll, Salinity, Nutrients, Standing crops, Arctic, Benthic flora, Algae, Phytoplankton, Zooplankton, Diatoms, Light, Copepods.
Identifiers: *Barrow(Alaska), Species diversity.

Data are presented on seasonal distribution of the phytoplankton and ice organisms and the environmental parameters that affect these organisms. Primary productivity, chlorophyll-a concentrations and the community composition of the benthic microalgae in the coastal waters of Chukchi Sea near Barrow, Alaska were determined. Primary productivity experiments were carried out using in situ incubation chambers placed in the sediment by SCUBA divers. High levels of primary productivity and chlorophyll-a during July and August can be attributed to the development of a mat of the filamentous diatom Amphipleura rutilans on the sediment surface. Light is a major factor affecting productivity in the benthic community. Chlorophyll-a concentrations were high during the period of winter darkness when primary productivity was low. Primary productivity and chlorophyll-a of the benthic microalgae have been compared with the ice algae and the phytoplankton. The composition and quantitative variability of the inshore marine zooplankton community near Point Barrow were investigated May 25 to August 28, 1972. Forty-six categories of zooplankton on several taxonomic levels were analyzed. The copepods were the major community constituents in terms of both biomass and species diversity. (Jones-Wisconsin)
W75-02259

RULE MAKING ON POLYCHLORINATED BIPHENYLS,
Food and Drug Administration, Washington, D.C.
S. D. Fine.
EIS-AA-73-1141-F-S, July 1973. 39 p.

Descriptors: *Regulation, *Polychlorinated biphenyls, Industries, Feeds, Foods, Public health, Legislation, Hazards, Toxicity, Pollutants.
Identifiers: Paper food packaging, PCB.

The Food and Drug Administration's Supplement to the Final Environmental Impact Statement provides additional information relative to the polychlorinated biphenyls (PCBs) rule making. Because of their unique chemical and physical properties and widespread, uncontrolled industrial uses, PCBs have become a persistent and ubiquitous contaminant in the environment, resulting in the contamination of certain foods. The proposed rule making includes the following provisions: Restrictions on the industrial uses of PCBs in establishments manufacturing, handling, or storing animal feeds, food, or food-packaging materials, in order to preclude the direct or accidental PCB contamination of these articles; amendment of food additive regulation No. 121.2546 to allow for food-packaging use of pulp from reclaimed fibers containing unavoidable poisonous or deleterious substances, providing these substances do not migrate to the food; establishment of temporary tolerances limiting the level of PCBs in animal feed, certain foods, and paper food-packaging materials as a result of unavoidable environmental contamination. Since this rule making will reduce human exposure to dietary sources of this toxic, chemical contaminant, FDA concluded in its Final Environmental Impact Statement that the rule making will have a beneficial effect on the quality of the human environment and that resultant health benefits will outweigh any adverse economic consequences. (Jones-Wisconsin)
W75-02263

A SURVEY OF THE MUSSELS (UNIONACEA) OF THE ILLINOIS RIVER: A POLLUTED STREAM,
Illinois State Natural History Survey, Urbana. Aquatic Biology Section.
W. C. Starrett.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-73-10812, $5.75 in paper copy, $2.25 in microfiche. Illinois Natural History Survey Bulletin, Vol 30, Article 5, p 266-403, 1971. (Report No NOAA-73050401). 8 fig, 8 tab. NOAA 4-13-R.

Descriptors: *Surveys, *Mussels, *Illinois, Water pollution effects, Shellfish, Pesticide residues, Population, Ecology, Conservation, Management, Rivers, Fish, Systematics.
Identifiers: *Illinois River, Margaritiferidae.

A survey was made of the pearly mussel (Mollusca: Pelecypoda: Unionacea) populations of the entire Illinois River in order to formulate a second basis for managing the mussel resource of this river, and to determine what species and distributional changes had taken place during the past century. The Illinois River has a long known record of pollution associated with the growth and expansion on its watershed of human populations, industries, and agriculture. Biological data collected from the river have revealed pollutional aspects not disclosed by chemical and bacteriological data. Mention of the Illinois River fishes is included because of their role as hosts for the parasitic, or glochidium, stage of freshwater mussels. A total of 429 collections was made of live mussels. The survey was designed to sample on a stratified basis, as many different sites in the entire length of the river as was possible. A synoptic report of the mussel fauna of the river intelligible to current and future workers is given with descriptions, museum records, live mussel records, and old shell records. (Jones-Wisconsin)
W75-02267

DIATOM SUCCESSION AND INTERACTION IN LITTORAL PERIPHYTON AND PLANKTON,
Victoria Univ. (British Columbia). Dept. of Biology.
S-D. Brown, and A. P. Austin.
Hydrobiologia, Vol 43, No 3, p 333-356, 1973. 6 fig, 2 tab, 53 ref.

Descriptors: *Diatoms, *Succession, *Littoral, Periphyton, Plankton, Canada, Seasonal, Temperate, Lakes, Competition, Distribution.
Identifiers: Elk Lake(British Columbia), Frangilaria crotonensis, Asterionella formosa, Melosira italica, Melosira varians, Fragilaria virescens, Achnanthes minutissima, Cocconeis placentula.

Few studies have included concurrent sampling of both phytoplankton and periphyton communities of the littoral. The seasonal successional pattern in dominant planktonic and periphytonic diatom species at different stations in the littoral are described, and examples of possible interaction of species populations between the two communities and species interaction within the periphyton, in relation to variation in significant physicochemical factors is discussed. Periphyton and plankton samples were collected at four littoral stations in a relatively shallow, eutrophic Elk Lake, British Columbia during six months. The most abundant planktonic diatoms demonstrated a pattern of seasonal succession typical of temperate lakes and all were present in the periphyton. This pattern was identical at all stations. Considerable station variation in successional patterns occurred over different exposure periods; station differences were least in samples immersed for monthly intervals, and greatest in those immersed for a cumulative four-month period. Interaction between the phytoplankton and periphyton was illustrated by the occurrence of species common to both habitats. Species interaction or competition was accentuated as exposure duration and periphyton total cell standing crops increased and species diversity decreased, apparently accounting, in part, for station differences in succession patterns. (Jones-Wisconsin)
W75-02268

THE INFLUENCES OF STEAM CONDENSER EFFLUENT ON FRESHWATER PHYTOPLANKTON DYNAMICS,
Cornell Univ., Ithaca, N.Y. Cornell Energy Project.
L. C. Pulis.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-228 754, $3.25 in paper copy, $2.25 in microfiche. Paper No 71-5, January 1971. 18 p, 1 fig, 24 ref. NSF-RANN.

Descriptors: *Cooling water, *Water pollution effects, *Phytoplankton, Buoyancy, Turbulence, Thermal pollution, Condensers, Nutrients, Light intensity, Eutrophication, Food chains, Dominant organisms, Photosynthesis, Steam, Biochemistry.
Identifiers: *Steam electric powerplants.

Effects of condenser cooling water discharges on aquatic organisms are reviewed with special consideration of dynamics of a simplified freshwater phytoplankton community. Buoyancy-turbulence interactions, influence of heat, 'giant predator concept,' nutrients, light, and bloom intensity are discussed in terms of heated water discharges from a steam electric station. The phytoplankton community has been chosen for initial dynamic investigation for several reasons: autotrophs are the primary carbon fixers; among the autotrophs, phytoplankton are directly susceptible to the influence of condenser operations and effluents; fluctuations in algal abundance, diversity, and dominance have an important impact (economic and aesthetic) on water uses by humans; the popular anti-thermal pollution literature, and consequently, perhaps, the utility-sponsored ecological research projects have seemingly devoted unbalanced attention to changes in fish and crustacean populations. Bella has provided a heuristic simulation model of the effect of vertical mixing on algal population dynamics opening many questions to ecologists. Bella's model should be evaluated by thermal engineers and biologists and expanded conceptually to discover what key parametric data is missing, and to design ecological monitoring of phytoplankton at presently operating steam electric stations to provide more useful data for quantifying phytoplankton dynamics. (Jones-Wisconsin)
W75-02269

A VISTA ON THE MARINE VEGETATION,
M. Waern.
Acta Phytogeographica Suecica, Vol 50, p 15-28, 1965. 6 fig, 50 ref.

Descriptors: *Marine plants, *Benthic flora, *Marine algae, Arctic, Salinity, Brackish water, Genetics, Distribution, Varieties.
Identifiers: *Baltic Sea, Bohusland(Sweden), Sweden, Norway, Oresund(Sweden).

An overall view of the Baltic Sea vegetation is presented. Groups of northern species are found

within Norwegian and Swedish fjords and occurrence of 'arctic' algae is well known. The Baltic, and its connections with the North Sea, constitutes a brackish water body of unusual size, differentiation and local saline stability. Baltic traits are traced in Swedish west coast vegetation and the Baltic current must be regarded as a source of brackish water components in the otherwise purely marine vegetation of the west coast. Relative to possible genetic significance of species isolation and formation of clones, it is uncertain whether an algae is a different race or nearly identical, but modified. Some algae of the deep-water vegetation north of the threshold in Oresund show trends in distribution and habitat that may have partial relation to salinity differences. Life as loose-and-entangled is not common in the rock vegetation. The fixed levels, usual with fucaceous algae, are not found in some belt-forming species. The successive downward dislocation and final disappearance of many truly marine species is, directly or indirectly, related to reduction in salinity, but, initially, to reduction of tide. Species showing evident dislocation are listed. (Jones-Wisconsin)
W75-02270

PLANKTON OF FRESH AND BRACKISH WATERS IN THE SODERTALJE AREA,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 2H.
W75-02276

COASTAL ALGAE OFF GOTEBORG IN RELATION TO GRADIENTS IN SALINITY AND POLLUTION,
P. E. Lindgren.
Acta Phytogeographica Suecica, Vol 50, p 92-96, 1965. 2 fig, 3 tab, 6 ref.

Descriptors: *Marine algae, *Coasts, *Salinity, Water pollution effects, Industrial wastes, Domestic wastes, Estuaries, Cladophora, Distribution.
Identifiers: *Goteborg(Sweden), Baltic Sea, Gulf of Bothnia.

Goteborg, on the western Swedish coast, contains a population of 400,000, industries and shipping and still discharges nearly all of its household and industrial waste water into the Gota River and estuary without purification. Attempts were made to compare the algal response to the salinity and pollution gradients around the coasts to the south and further, into the Baltic and Bothnian basins. The presence of Cladophora rupestris at low salinity, absence of Spirulina subsalsa and the rarity of Porphyra and Ulva, etc., are signs of low pollution in the northern area, which may be regarded as oligosaprobic. The greater degree of pollution in the southern estuary is evidenced by the inner limits of Cladophora rupestris, Fucus spiralis, and Trailliella intricata off-shore, at higher salinity than expected; the occurrence of a Fucus edentatus horizon in the two transitional districts; the composition of the Enteromorpha horizon, with little E. ahlneriana; mass occurrence of Mytilus edulis in the two inner districts; and occurrence of Spirulina subsalsa; mass occurrence of (detached) Ulva lactua f. latissimia in the same districts, where flotsam is composed of this species, and Enteromorpha; and the gray 'pubescene' on Cladophora glomerata. (Jones-Wisconsin)
W75-02277

A PLANKTON SAMPLE FROM LAKE VICTORIA,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 2H.
W75-02280

MOUNTAIN MIRES,
For primary bibliographic entry see Field 2I.
W75-02281

PLANKTOLOGICAL NOTES FROM WESTERN NORTH AMERICA,
Uppsala Univ., (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 2H.
W75-02282

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT. VOLUME II. WATER QUALITY DETERMINATIONS,
Hydrologic Engineering Center, Davis, Calif.
R. W. Hann, Jr., and R. G. Willey.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-762 109, $5.75 in paper copy, $2.25 in microfiche. Report HEC-IHD-1100, July 1972. 138 p, 7 fig, 11 tab, 63 ref, 2 append.

Descriptors: *Reservoirs, *Biology, *Physical properties, *Chemical properties, *Water quality, Water temperature, Density, Turbidity, Organoleptic properties, Water pollution sources, Analytical techniques, Waste treatment, Bioindicators, Eutrophication, Water quality standards, Mathematical studies, Surveys, Management, Legislation, Thermal stratification, Computer programs.

The physical, chemical, and biological breakdown is useful in considering water quality suitable for a wide variety of demands. Water of a quality unsatisfactory for one use may be perfectly acceptable for another. The level of acceptable quality is often governed by scarcity of the resource or the availability of a superior water quality. The equation for calculating the quality of reservoir storage at the end of a given time period is given. The simplest analysis for the discharge of conservative materials to a stream is presented. Water quality surveys may range from a program of monthly samples analyzed with a portable field kit to a program of continuous electronic monitors, supported by a sophisticated laboratory, and by automated data storage and retrieval systems. Various techniques are available to improve the water quality. If used properly, reservoirs can achieve substantial benefits; however, unwise use of reservoirs may cause increased quality degradation. Experience points out that good water quality is not maintained without legislative control. Four congressional acts with five amendments, and recent presidential executive orders, constitute the existing status of water quality legislation for United States' surface waters. (Jones-Wisconsin)
W75-02283

VERTICAL ZONATION OF LITTORAL ALGAE IN BOHUSLAN,
J. Soderstrom.
Acta Phytogeographica Suecica, Vol 50, p 85-91, 1965. 6 fig, 28 ref.

Descriptors: *Distribution, *Littoral, *Algae, *Fjords, Water level fluctuations, Salinity, Systematics, Temperature, Marine algae, Shores, Seasonal.
Identifiers: Vertical zonation, Bohuslan(Sweden).

Ther vertical arrangement of marine algae growth was studied in three different situations--a sheltered site, a medium exposure, and an exposed skerry in the Bohuslan Province of Sweden. The species found every month at various depths are listed. Even in a medium exposure, the more sheltered parts of adjacent Koljo Fjord, the vegetation differed. The species are recorded. A still different vegetation is found on an exposed skerry. With increasing exposure to waves, Ascophyllum nodosum as well as Fucus vesiculosus and F. serratus decrease in quantity and finally disappear. In the Laminaria-Chorda belt, Laminaria digitata becomes more and more prominent. Further down red algae prevail. The Spermatochnus bottom, so characteristic of the inner, sheltered waters, is no longer observed. The vegetation of the skerry is given in detail. Below the Nemalion-Balanus-Fucus belts, a very characteristic belt with Polysiphonia Brodiaei as the most prominent, follows. Approximately at the low water level Polysiphonia Brodiaei disappears. A belt dominated by Chordaria flagelliformis, Ceramium secundatum and Corallina officinalis follows. A little deeper down Polysiphonia elongata becomes a characteristic element of the vegetation. (Jones-Wisconsin)
W75-02284

REFLECTIONS ON ARCTIC AND ALPINE LAKES,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 2H.
W75-02285

CONTRIBUTIONS TO THE KNOWLEDGE OF THE PLANKTON IN SCANDINAVIAN MOUNTAIN LAKES. 4,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
K. Thomasson.
Botaniska Notiser, Vol 110, No 2, p 251-264, 1957. 5 fig, 27 ref.

Descriptors: *Plankton, Lakes, Systematics, Classification, Varieties, Distribution.
Identifiers: *Scandinavia, *Staurastrum, Desmids, Mountain lakes.

There are so many different forms of Staurastrum paradoxum depicted in the literature under this name that its limits have been extended 'ad absurdum.' It is obvious that Ataurastrum paradoxum is composed of an array of different species which are quite distinctive from taxonomic, geographical, and ecological points of view. It is often quite impossible to define the limits of Staurastrum species by only a few characters and very difficult to describe the species adequately in words; a good drawing is always of vital importance. The interpretation of many Staurastrum species remains a subjective matter. It seems to be impossible to find out clearly what was in reality the desmid Staurastrum paradoxum as described by Meyen in 1829. To avoid serious difficulty it is preferable to describe it as a new species. Thus the alga pictured is called Staurastrum vulgaris n. sp. It has a very wide distribution and has often been reproduced in the literature. The forms it should be compared with are given. Four other species of Staurastrum are described, depicted in drawings, and their distributions given. (Jones-Wisconsin)
W75-02286

STUDIES ON SOUTH AMERICAN FRESHWATER PLANKTON. 3. PLANKTON FROM TIERRA DEL FUEGO AND VALDIVIA,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
K. Thomasson.
Acta Horti Gotoburgensis, Vol 19, No 6, p 193-225, 1955. 5 fig, 2 tab, 39 ref.

Descriptors: *South America, *Lakes, *Plankton, Phytoplankton, Rotifers, Chara, Temperate, Systematics, Varieties, Rivers.
Identifiers: *Tierra del Fuego(Argentina), *Valdivia(Chile), Desmids, Amazon Basin.

The plankton of five lakes in Tierra del Fuego, two lakes in Valdivia, and three samples from the Amazon Basin are described. Lago Fagnano plankton, dominated by Dinobryon divergens, is rather rich in species. Cabecera Lago plankton are dominated by Dinobryon divergens and the rotifera, Filina limnetica, Conochilus hippocrepis, and Keratella cochlearis. Lago Roca contains an exceedingly poor plankton population. Only Staurastrum corpulentum, Keratella cochlearis, and Philodina sp. were found in reasonable quantities. Laguna de la Peninsula dominant plankton were Botryococcus braunii, Eudorina elegans, and Peridinium willei. In a small lake with Chara vegetation, the plankton is dominated by Paulschulzia pseudovolvox. In Valdivian lakes

Lago Rinihue, Melosira granulata is dominant; the plankton, rather poor in species, can be called spring plankton. Plankton of Lago Panguipulli is similar to that of Lago Rinihue. From the Amazon Basin, one Rio Negro sample is dominated by the diatoms Melosira granulata and Asterionella gracillima. Occurrence of desmid species Closterium, Cosmarium and Staurastrum represented in temperate South America and in some other extra-tropical regions is given. Synoptical results of qualitative analysis and phytoplankton ratios of the lakes in Tierra del Fuego and Valdivia are tabulated. (Jones-Wisconsin)
W75-02287

BIODEGRADATION OF CHLORINATED ORGANIC COMPOUNDS,
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
R. S. Ingols, and P. C. Stevenson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-227 868, $3.75 in paper copy, $2.25 in microfiche. Final Report EES Project No B-228, March 1963. 34 p, 10 fig, 6 tab, 10 ref.

Descriptors: *Biodegradation, *Chlorinated hydrocarbon pesticides, Chlorides, Phenols, Ions, Adsorption, Toxicity, Fish, Dissolved oxygen, Chlorine, Biochemical oxygen demand.

Many economic poisons consisting of organic compounds with a large number of carbon-chlorine bonds, such as pentachlorophenol, sometimes have undesirable side effects but are subject to some biological degradation. It was thought that there might be biological inhibition from an addition or substitution of chlorine onto the organic molecule. Nine chlorinated phenols were studied for biological degradation rate. The disappearance of the phenol was observed by recording changes in ultraviolet adsorption. The cleavage of the carbon-chlorine bond was determined by observing the increase in the chloride ion. Some compounds could be degraded completely in 3 to 4 days; others were only partially degraded during this time; sodium pentachlorophenate was not degraded. There is some evidence that the decrease in concentrations of the more biologically refractive compounds occurs by adsorption into the slime and that these compounds are not immediately degraded. The toxicity of these compounds to fish shows a rough correlation with the ease of bacterial degradation. The fish toxicity is greatly reduced by an increase in dissolved oxygen, indicating that death may result from the same mechanism reported for phenol--asphyxia from damage to the nervous system. (Jones-Wisconsin)
W75-02288

ANALYSIS OF NONIONIC DETERGENTS IN RAW SURFACE WATERS BY THIN-LAYER CHROMATOGRAPHY AND INFRARED SPECTROSCOPY,
Federal Water Pollution Control Administration, Cincinnati, Ohio. Div. of Pollution Surveillance.
For primary bibliographic entry see Field 5A.
W75-02289

AN ECOLOGICAL SURVEY OF THE ALGAE OF HUNTINGTON CANYON, UTAH,
Brigham Young Univ., Provo. Utah. Dept. of Botany and Range Science.
L. E. Squires, S. R. Rushforth, and C. J. Endsley.
Biological Series, Vol 28, No 2, June 1973. 87 p, 41 fig, 37 tab, 54 ref. NIH FR5 505-RR-0711-03.

Descriptors: *Baseline studies, *Ecology, *Algae, Utah, Plankton, Nannoplankton, Periphyton, Physical properties, Chemical properties, Ponds, Diatoms, Chara, Cladophora, Watersheds(Basins), Cyanophyta, Electric power plants, Geology, Vegetation, Climates, Systematics.
Identifiers: *Huntington Canyon(Utah), Hydrurus foetidus, Cladophora glomerata, Oedogonium, Chara vulgaris.

The need for this study stemmed from the construction of a coal-fired power generating station and a 30,000 acre-foot reservoir by the Utah Power and Light Company. The initial goal was to gather data on physical, chemical, and biological parameters, which may be used to determine future changes in this ecosystem, and to obtain an overall picture of the entire aquatic algal flora rather than one specific part. Sampling included water chemistry, quantitative analysis of phytoplankton and attached algae, and a floristic survey. Selected algal studies in Utah are reviewed. A description is given of the Huntington Canyon drainage. Huntington Creek contains a wide diversity of general and species of algae; diatoms are the main constituent throughtout the year. Hydrurus foetidus is prevalent in Huntington Creek from late winter to early summer, and filamentous blue-green algae abound in summer and fall. Cladophora glomerate, Oedogonium sp., and Chara vulgaris are abundant in the creek beyond the mouth of the canyon. Most plankton in Huntington Creek originate on the substrate and in reservoirs on the left fork. Huntington Creek is a cold, fast-flowing hard-water mountain stream, and its algal flora is typical of such a habitat. (Jones-Wisconsin)
W75-02290

ALGAE CONTROL BY MIXING,
New Hampshire Water Supply and Pollution Control Commission, Concord.
T. P. Frost, R. E. Towne, and H. J. Turner.
Staff Report No 59, June 1973. 109 p. 21 fig, 28 tab, 82 ref.

Descriptors: *Algal control, *Mixing, Fishkill, Recreation, Opacity, Dissolved oxygen, Destratification, Phosphorus, Nitrates, Nitrogen, Dissolved solids, Costs.
Identifiers: *Kezar Lake(NH), Aphanizomenon flos-aquae.

Kezar Lake, North Sutton, New Hampshire has been deteriorating as a recreational area since 1964, due to recurring blue-green algae blooms. It has been under study and experiment by the New Hampshire Water Supply and Pollution Control Commission since 1963. In 1968, four 3-hp drive, two-cylinder air compressors were installed on the shore of the lake and a 2-inch plastic pipe was led to the deepest part. Continued improvement occurred during the summer of 1971. During the summer of 1971 Kezar Lake provided continuous acceptable swimming conditions with a Secchi disc transparency of four feet or more from July 2nd through Labor Day. A massive bloom of Aphanizomenon flos-aquae occurred during the month of June reaching a peak of more than one million cells per ml on July 17th and reducing the Secchi disc transparency to 1-1/2 ft. A rapid decline in cell count between June 23rd and July reduced the population of Aphanizomenon to practically zero and raised the Secchi disc transparency to 7 feet. The lake was practically isothermal and the dissolved oxygen homogeneous throughout the water column through July and August. (Jones-Wisconsin)
W75-02291

FORMULATION OF A NUMBERS-BIOMASS MODEL FOR SIMULATING THE DYNAMICS OF AQUATIC INSECT POPULATIONS,
Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Environmental Engineering.
C. L. Zahorcak.
Eastern Deciduous Forest Biome IBP Memo Report 74-5 (FWI Report 74-13), July 1974. 49 p, 11 fig, 14 ref. NSF AG-199,40-193-69.

Descriptors: *Mathematical models, *Dynamics, *Aquatic insects, *Aquatic population, Benthic fauna, Diptera, Zooplankton, Fish, Weight, Respiration, Biomass, Dissolved oxygen, Mortality.
Identifiers: Consumption.

Based on the general consumer model used in the Eastern Deciduous Forest Biome, a mathematical model for benthic insects, particularly Chironomids, has been developed by coupling a numbers balance differential equation to the widely used biomass balance differential equation. In addition to measuring the number of insects at various points in time, this approach allows the calculation of the mean weight of the population. For many animals, processes such as consumption and respiration are functions of body weight. For benthic insects in particular, progression through the larval stages to pupation and adulthood is a function of the organism's size. This general numbers-biomass algorithm is suitable for modeling other organisms such as zooplankton and fish. The numbers equation was formulated by grouping those process terms from the biomass equation which involve the loss of discrete numbers of organisms. Chironomids and other benthic insect larvae live in the bottom muds of lakes and streams and feed upon detrital material, consisting of organic deposits and phytoplankton. In addition to weight, the level of dissolved oxygen has been incorporated as a variable in the calculation of process terms such as consumption, respiration, and mortality. (Jones-Wisconsin)
W75-02293

THERMAL EFFECTS ON THE CONNECTICUT RIVER: PHYCOLOGY AND CHEMISTRY,
Goucher Coll., Baltimore, Md. Dept. of Biological Sciences.
J. W. Foerster, F. R. Trainor, and J. D. Buck.
Journal Water Pollution Control Federation, Vol 46, No 9, p 2138-2152, 1974. 8 fig, 7 tab, 48 ref. EPA 142-12-177.

Descriptors: *Thermal stress, *Connecticut River, *Nuclear powerplants, Rivers, Phytoplankton, Periphyton, Ecology, Estuaries, Mathematical studies, Water pollution effects, Water chemistry, Nuisance algae, Water temperature.

This investigation focuses on the effects of thermal enrichment by a nuclear electric generation station on the already stressed Connecticut River. Evaluated, particularly, is the level at which heat output will affect algae, phytoplankton, and phycoperiphyton. Multiple regression and correlation analyses were preformed, using the various chemical and physical parameters as independent variables and the phytoplankton quantitative counts as the dependent variable. Chemical tests included analyses of dissolved oxygen, ortho and total phosphate, nitrate-nitrogen, nitrite-nitrogen, ammonia-nitrogen, organic nitrogen, chlorophyll, and salinity. Physical tests measured pH, temperature, and conductivity. To understand effects of the change of temperature on phytoplankton, circulation patterns and mixing properties may be considered as a retention time. Retention times are presented as a conservative estimation of the length of time each alga was subjected to a thermal stress. It is emphasized that the thermal discharge has created a changing environment that acts as a stimulator. The enhanced plankton bloom and phycoperiphyton growth could become an economic deterrent to further industrial uses of downstream waters because of increased cleaning costs for intake condensers, air conditioners, and other equipment. (Jones-Wisconsin)
W75-02295

GLUCOSE-14 UPTAKE IN LAKE HIIDENVESI,
Helsinki City Waterworks (Finland).
H. Seppanen, and T. Ojanen.
Aqua Fennica, p 95-102, 1973. 10 fig, 2 tab, 13 ref.

Descriptors: *Kinetics, *Absorption, *Carbohydrates, Bacteria, Algae, Water pollution,

Epilimnion, Hypolimnion, Velocity, Biomass, Mathematical studies.
Identifiers: *Heterotrophic activity, Lake Hiidenvesi(Finland), Glucose.

Lake Hiidenvesi is a part of the raw water supply to the Helsinki waterworks. The heterotrophic activity in different areas of the lake was estimated using glucose-14. Algal uptake of glucose was measured by Chlorella inocula in test bottles with filtered and sterilized lake water. After ten days incubation (one test bottle was incubated in light and the other in dark) different amounts of unlabeled glucose and 100 microliters labeled glucose were added. After 3 hours incubation in dark, samples were fixed, filtered, and activity measured. The glucose uptake was most effective in most polluted areas of the lake which is situated near the small town of Vihti. The glucose uptake effectivity decreased with the decreasing pollution level of the water. At station 7 different activities were found in the epilimnion and hypolimnion indicating the possibility of two different populations. The method was successful if the velocity values are taken. More about factors affecting transport constants should be known before this method can be used for determining the natural substrate concentration. In those cases where a linear function appears, this is a good method for estimating the heterotrophic activity of bacteria and algae populations. (Jones-Wisconsin)
W75-02296

EFFECTS OF ARTIFICIAL HYPOLIMNION AERATION ON RAINBOW TROUT (SALMO GAIRDNERI RICHARDSON) DEPTH DISTRIBUTION,
Michigan State Univ., East Lansing.
A. W. Fast.
Transactions of American Fisheries Society, No 4, p 715-722, 1973. 7 fig, 13 ref. EPA 16010 EXE.

Descriptors: *Hypolimnion, *Aeration, *Rainbow trout, Water temperature, Distribution, Michigan, Eutrophication, Meromixis, Oxygen, Thermal stratification.
Identifiers: *Hemlock Lake(Mich).

Although Hemlock Lake, Michigan is eutrophic and develops anaerobic conditions below the thermocline, trout survive year-round since the epilimnetic temperatures are not too severe. Rainbow trout were observed during normal stratification during the summer 1969, and their response to artificial hypolimnetic aeration was observed during the summer 1970. The aeration system involved a special aeration tower and compressed air injection. Hypolimnetic oxygen concentrations increased from zero to saturation during aeration. Thermal stratification was gradually reduced by the aeration, but the lake remained thermally stratified for 10 weeks during aeration. The depth distribution of trout partially acclimated to different temperature and depth conditions were observed. Before aeration, the trout were limited to shallow depths by the anaerobic hypolimnion. They inhabited the deepest depths soon after aeration began and occupied the entire water column during artificial aeration. The dispersion of the trout through the hypolimnion soon after aeration began indicates that hydrogen sulfide and carbon dioxide were rendered innocuous with the addition of oxygen, and that temperature also became suitable during aeration. (Jones-Wisconsin)
W75-02297

STATISTICAL ANALYSIS, DATA MANAGEMENT AND ECOSYSTEM MODELING AT LAKE GEORGE, NEW YORK,
Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Geology.
R. A. Park, J. W. Wilkinson, R. C. Kohberger, J. A. Bloomfield, and C. S. Zahovcak.
EDFB Memo Report 73-64 (FWI 73-20), 1973. 7 p, 10 ref. NSF AG199,40-193-69.

Descriptors: *Computer models, *Productivity, *Model studies, Statistical methods, Data collections, Lakes, New York, Phosphorus, Cycling nutrients, Sediments, Phytoplankton, Insects, Zooplankton, Organic matter, Benthos, Bass, Algorithms, Equations, Degradation(Decomposition), Deep water, Methodology, Regression analysis, Nannoplankton, Predation, Crustaceans, Aquatic plants, Carp, Carbon, Nitrogen.
Identifiers: *Lake George(NY), *Lake model CLEAN, Bluegills.

The Lake George modeling group has had primary responsibility for implementation of the Biome aquatic model CLEAN. Procedures to determine the sensitivity and values of parameters in the phytoplankton model have been investigated. Cluster analysis and ordination techniques developed were applied to data from the 86 lakes and reservoirs representing the Freshwater Productivity section of IBP. The primary emphasis on data management was to refine and de-bug the FIND system and build up the data base. CLEAN has been refined so that it now stands as one of the most detailed and versatile lake ecosystem models in existence. Development and implementation of an ecologically realistic model has required careful attention to content, construct and concurrent validity. Each submodel has been evaluated separately by considering its relationship to the total ecosystem model. In order to simulate benthic insects, which are characterized by complex population dynamics, it was necessary to develop a combined numbers-biomass algorithm to take the place of the original population construct in the general consumer model. Equations for predatory zooplankton, bluegills, decomposers and particulate and dissolved organic matter have been added to CLEAN and chart functions have been included for bass and benthos. (Jones-Wisconsin)
W75-02298

THE INFLUENCE OF MANURE SLURRY IRRIGATION ON THE SURVIVAL OF FECAL ORGANISMS IN SCRANTON FINE SAND,
Florida Univ., Gainesville. Dept. of Microbiology.
For primary bibliographic entry see Field 5B.
W75-02315

EFFECT OF PRESCRIBED BURNING ON SEDIMENT, WATER YIELD, AND WATER QUALITY FROM DOZED JUNIPER LANDS IN CENTRAL TEXAS,
Texas Tech Univ., Lubbock. Dept. of Range and Wildlife Management.
For primary bibliographic entry see Field 4A.
W75-02345

EFFECT OF POLLUTION ON DISTRIBUTION OF LPP PHYCOVIRUSES IN RELATION TO POLLUTION OF THE CHRISTINA RIVER,
Delaware Univ., Newark. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W75-02348

BRUSH CONTROL ALONG AGRICULTURAL DRAINAGE DITCHES: ENVIRONMENTAL SAFETY AND EFFICACY OF HERBICIDE FORMULATIONS,
Purdue Univ., Lafayette, Ind. Dept. of Botany and Plant Pathology.
For primary bibliographic entry see Field 5B.
W75-02349

NUTRIENTS AND EUTROPHICATION IN THE PAMLICO RIVER ESTUARY, N.C. 1971-1973,
North Carolina State Univ., Raleigh. Dept. of Zoology.
J. E. Hobbie.
Available from the National Technncal Information Service, Springfield, Va 22161 as PB-238 051, $7.50 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, (UNC-WRRI-74-100), No 100, Aug. 1974. 239 p, 62 fig, 23 ref, 2 append. OWRR B-041-NC(2), B-052-NC(2). 14-31-0001-3623, 14-31-0001-3917.

Descriptors: *Eutrophication, *Estuaries, Estuarine environment, *Nutrients, Cycling nutrients, Phytoplankton, Phosphates, Nitrogen, Ammonia, Chlorophyll, Mining, *North Carolina.
Identifiers: *Pamlico River(NC), Pamlico Sound(NC), Pamlico Estuary(NC), Tar River(NC), *Phosphate mining.

A study was initiated in 1966 to determine hydrography, nutrient concentrations, and phytoplankton speciation and biomass in relation to inputs from the Tar River Basin and from phosphorus mining activities. Results are presented for 1971-73. Highest concentrations of phosphorus occur in the middle of the estuary, with moderate concentrations in the upper estuary and lowest concentrations in the lower estuary. The level of phosphorus entering the estuary from the Tar River did not increase during the study period. Phosphorus concentrations in the Pamlico River are always higher than needed for algal blooms. Ammonia is present year-round at moderate to high concentrations, whereas nitrite is present only at extremely low levels. The ammonia is used by algae in the river but is also produced during bacterial decomposition. Thus, ammonia is a dynamic compound whose movement is masked by the balance between production and loss. Nitrate nitrogen is always moderately high in the incoming rivers and streams but usually is completely used up by the algae in the upper estuary. However, the total quantity entering the estuary increases drastically during winter and high concentrations then move as far as the middle of the estuary before being used up by biological activity and diluted by Pamlico sound water. These high concentrations of nitrate trigger blooms of algae each late winter or early spring. Algae in the river, as estimated from the concentration of chlorophyll a, were the highest ever in 1972-1973. (McJunkin-North Carolina State)
W75-02353

PRESENT AND HISTORIC GEOCHEMICAL RELATIONSHIPS IN FOUR MAINE LAKES,
Maine Univ., Orono. Dept. of Geological Sciences.
D. R. Sasseville.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-238 030, $4.25 in paper copy, $2.25 in microfiche. MS Thesis, May 1974. 67 p, 10 fig, 6 tab, 67 ref, append. OWRT A-026-ME(1).

Descriptors: *Lakes, *Eutrophication, *Organic matter, *Lake sediments, *Maine, Sedimentation rates, Chemical stratification, Limnology, Sediment-water interfaces, Nutrients, Connate water, Cores, Geochemistry, Pollen, Watersheds(Basins), Hydrogen ion concentration, Oxidation-reduction potential, Spectrophotometry, Colorimetry, X-ray diffraction, Cultures.
Identifiers: *Embden Pond, *China Lake, *Tunk Lake, *Fish River Lake, *Ambrosia.

Undisturbed 1 m cores of profundal sediment and overlying water were collected from four morphometrically paired lakes with differing alkalinities and cultural developments (including lumbering). Vertical variations in sediment chemistry strongly correlate with the beginning of European man's activity in the watersheds of the two mesotrophic lakes (China and Fish River) and one of the oligotrophic lakes (Embden). Tunk Lake (oligotrophic) exhibits long-term increases in sediment chemistry. The average cultural sediment accumulation rate for Tunk Lake is 400%

higher than the pre-cultural average (0.2 mm/yr from 2825 to 170 years before the present). FeO and MnO show upward enrichment in the oligotrophic lake sediments (OLS) due to diffusion and precipitation, whereas an upward increase of FeO and MnO in the mesotrophic lake sediments (MLS) is largely culturally controlled. Interstitial water chemistry profiles are largely diffusion controlled and indicate movement of all dissolved species to or through the sediment-water interface. A pronounced 'reactive' layer with high concentrations of dissolved species is present in all sediments at a depth of 1 to 5 cm. Layers with less pronounced high values are distributed throughout the core. Trophic status appears to exert greater control over sediment and interstitial water chemistry than does degree of cultural development. (Visocky-ISWS)
W75-02359

SEASONAL CHANGES IN NUMBERS OF SOME PHYSIOLOGICAL GROUPS OF MICROORGANISMS IN ILAWA LAKES,
Wyzsza Szkola Rolnicza, Olsztyn-Kortowo (Poland). Katedra Mikrobiologii Technicznej.
S. Niewolak.
Pol Arch Hydrobiol. Vol 20, No 3, p 349-369, 1973. Illus.
Identifiers: *Bacterioplankton, Lakes, Microorganisms, Plankton, *Poland(Ilawa Lakes), Pollution, *Seasonal Yeasts, *Entrophication, Water pollution effects, *Bacteria(Heterotrophic).

Bacterioplankton, heterotrophic bacteria and yeasts are more abundant in the polluted Lake Jeziorak Maly than in that of the eutrophic Lake Jeziorak (Poland). In the muddy and sapropelic bottom sediments of the lakes the microorganisms are more abundant than in sandy soils. They are also abundant in the net plankton of Ilawa lakes. The maximum amounts of bacterioplankton, heterotrophic bacteria and yeasts in the water and bottom sediments of Ilawa lakes usually occurred in spring or at the beginning of summer and in autumn; the minimum amounts in summer and winter. Extensive deviations from the general seasonal course were more frequently observed in Jeziorak Maly Lake. Seasonal variations in the numbers of microorganisms were also observed in the net plankton.--Copyright 1974, Biological Abstracts, Inc.
W75-02373

SUMMARY REPORT, 1973, FOOD PROTECTION AND TOXICOLOGY CENTER,
California Univ., Davis. Food Protection and Toxicology Center.
For primary bibliographic entry see Field 5A.
W75-02379

PHYTOPLANKTON IN TWO PONDS IN KATHMANDU VALLEY (NEPAL),
Max-Planck-Institut fuer Limnologie zu Ploen (West Germany).
For primary bibliographic entry see Field 2H.
W75-02402

INADEQUACY OF ALGAL PRIMARY PRODUCTION AND ACCUMULATION OF ORGANIC MATTER, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
M. I. Kuz'menko.
Gidrobiol Zh, Vol 9, No 4, p 73-75, 1973.
Identifiers: Algal growth, Nutrition, *Organic matter, *Primary production, Biomass, Eutrophication, Absorption.

Under conditions of mixotrophic nutrition, the biomass of algae acquires an anamorphic character and cannot be equivalent to the magnitude of primary production. Taking into account the expenditure of organic matter during biological oxidation and its quantity liberated intravitally by the plant cell, the above is illustrated by the equation: delta b = a + q - d - c, where delta b is the increment of organic matter of the plant cell, a is the organic matter produced during autotrophic synthesis, q is the organic matter absorbed by the cell heterotrophically, d is the organic matter expended during oxidation and c is the organic matter of extracellular excretions. The increment of organic matter of the plant cell in this equation is represented as the sum of additive quantities. The proportion of the addends can vary considerably during ontogenetic development of algae and can depend not only on factors determining autotrophic and heterotrophic metabolism but on the degree of eutrophication of the medium. This equation explains the inadequacy of the magnitudes of primary production and biomass of phytoplankton often found.--Copyright 1974, Biological Abstracts, Inc.
W75-02409

ECOLOGY OF SOME RARE AQUATIC PLANTS AT THE NORTHERN LIMIT OF THEIR RANGE, (IN RUSSIAN),
M. P. Shilov.
Bot Zh. Vol 58, No 10, p 1554-1559. 1973.
Identifiers: *Aquatic plants, *Ecology, Eutrophication, Lakes, Nelumbo-komarovii, Salvinia-natans, Trapa-amurensis, Trapa-maximowiczii, Trapa-natans, *USSR.

The ecological characteristics of the habitats of some ancient and relict aquatic plants, Trapa natans, T. maximowiczii, T. amurensis, Salvinia natans and Nelumbo komarovii, at the northern limit of their range in European USSR and Far East are given. For the most part, these plants are confined to floodplain or wind-sheltered eutrophic lakes with swampy shores. It is possible that these plants grew under similar ecological conditions in past epochs (in the late Cretaceous and Tertiary periods), since the present-day habitats of the relict plants often have features of the earlier physiographic conditions. The discovery of these rare plants species in the indicated lakes may indicate only that they were exterminated by man in other types of lakes.--Copyright 1974, Biological Abstracts, Inc.
W75-02425

METHODS FOR MEASURING THE PRIMARY PRODUCTIVITY AND STANDING CROPS OF AN EPIPHYTIC ALGAL COMMUNITY ATTACHED TO SCIRPUS VALIDUS,
Alberta Univ., Edmonton. Dept. of Botany.
For primary bibliographic entry see Field 5A.
W75-02429

SOME RESULTS OF THE ACTION OF WARM WATERS FROM THERMAL STATIONS ON THE EMISSARIES,
V. Chiriac.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 384-391, 4 fig, 1 tab.

Descriptors: *Water resources, *Thermal pollution, *Europe, Heated water, Water temperature, Water pollution, Rivers, Lakes, Biochemical oxygen demand, Dissolved oxygen, On-site investigations, Aquatic environment, Aquatic life, Amphipoda, Plankton.
Identifiers: *Romania, Jiu River(Romania), Siut-Ghiol Lake(Romania).

The general observation of results of field studies was that the warm water discharged from thermal power stations into Jiu River and Siut-Ghiol Lake had a small influence on the physical-chemical and biological characteristics of the receiving waters. In the Jiu River, other pollutants from upstream coal mining and a wastewater outlet from a chemical plant appeared to have a more negative influence. In the Siut-Ghiol Lake, important qualitative changes occurring throughout the entire body of water were the result of wastewater discharge containing a high content of nitrogen and phosphorus; the small and limited influence of warm waters was negligible. (See also W75-02440) (Humphreys-ISWS)
W75-02463

ALLOCHTHONOUS ORGANIC CARBON OF A MARL LAKE,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
For primary bibliographic entry see Field 2H.
W75-02481

EFFECTS OF THE HERBICIDE PARAQUAT ON THE ECOLOGY OF A RESERVOIR. I. BOTANICAL AND CHEMICAL ASPECTS,
University of Wales Inst. of Science and Tech., Cardiff. Dept. of Applied Biology.
M. P. Brooker, and R. W. Edwards.
Freshwater Biology, Vol 3, No 2, p 157-175, 1973. 7 fig, 5 tab, 51 ref.

Descriptors: *Aquatic weed control, *Herbicides, *Reservoirs, Effects, Paraquat, Chara, Sediments, Water chemistry, Alkalinity, Biomass, Productivity, Algal control, Absorption, Succession.
Identifiers: Potamogeton pectinatus, Myriophyllum spicatum, Chara globularis, Barry(Wales).

A field experiment to determine major ecological effects of paraquat, used for weed control, in a Barry, Glamorgan, Wales reservoir dealt primarily with changes in flora, chemistry, and the fate of paraquat. Application of paraquat (1.0 mg/l) to the reservoir was successful in controlling Potamogeton pectinatus and Myriophyllum spicatum. A second application (0.6 mg/l) failed to control replacement growth of the macrophytic alga, Chara globularis. Paraquat was quickly lost from the water after each application and was largely taken up by the sediments, never more than 6% of the initial dose being recorded from the macrophytes. Sediment analysis indicated that about 36% of the total amount of paraquat applied to the reservoir was not recovered. Some changes in the chemistry of the water after the first paraquat application were consistent with the death of plants (e.g., alkalinity), but there was no evidence that the subsequent decay of the plants produced large increases in concentrations of major nutrients in the water. Although there was no gross deoxygenation there were changes in the oxygen status of the water following the herbicide-induced death of the angiosperms. (Jones-Wisconsin)
W75-02499

MICROFAUNA OF FEW EULITTORAL HABITATS OF MICKOLAJSKIE LAKE WITH SPECIAL CONSIDERATION TO THE NEMATODES (NEMATODA),
Warsaw Univ. (Poland). Dept. of Hydrobiology.
B. E. Wasilewska.
Ekologia Polska, Vol 21, No 4, p 57-72, 1973. 4 fig, 2 tab, 27 ref.

Descriptors: *Aquatic microorganisms, *Littoral, *Habitats, *Nematodes, Sands, Protozoa, Rotifers, Oligochaetes, Copepods, Crustaceans, Tubificids.
Identifiers: *Eulittoral, *Mikolajskie Lake(Poland), Tardigrada, Ostracods.

Mikolajskie Lake, Poland is a eutrophic, holomictic body, xurface 460 ha, maximal depth 27.8 m, mean depth 11 m and shoreline 14,400 m. Three stations were sampled on the southwestern shore during April to November 1968. In the examined habitats of the eulittoral, Protozoa, Rotatoria, Nematoda, and Oligochaeta dominated. Tardigrada, Copepoda, Cladocera, and Ostracoda were rare.

Protozoans dominated on the lake border and in the submerged eulittoral, whereas the nematodes dominated the emergent part of the eulittoral. Rotifers preferred the border of land and water. Oligochaeta were most numerous in the emergent eulittoral and less numerous in the border zone and in the submerged eulittoral. The abundance of dominant microfauna of the sandy, stony and detritus substrate of the eulittoral was compared with sandy beaches described in literature. Protozoans and rotifers of the eulittoral were poorer than protozoans and rotifers from sandy beaches, whereas the Nematoda and Oligochaeta were more abundant. Thirty-three species of Nematoda were found of which Chromadorita leuckarti occurred abundantly in all habitats. Oligochaeta were found more numerously on bottoms with detritus than on sandy bottoms. The number of Nematoda changed visibly with periodic flooding and drying of the eulittoral. (Hones-Wisconsin)
W75-02500

BIOLOGICAL PRODUCTIVITY OF TWO SUBARCTIC LAKES,
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
For primary bibliographic entry see Field 2H.
W75-02501

SOME THOUGHTS ON NUTRIENT LIMITATION IN ALGAE,
Dunstaffnage Marine Research Lab., Oban (Scotland).
M. R. Droop.
Journal of Phycology, Vol 9, No 3, p 264-272, 1973. 14 fig, 15 ref.

Descriptors: *Nutrients, *Algae, *Limiting factors, Growth rates, Absorption, Mathematical models.
Identifiers: Luxury consumption, Liebig's law.

In considering nutrient limitation, three types of experiments can be performed--measurement under dynamic conditions in batch cultures growing exponentially in labeled medium; (when the inoculum is extremely small several generations are possible before the medium nutrient level shows a significant drop so that conditions are, to all intents, steady state. The specific rate of uptake is then the product of the specific growth rate and cell nutrient quota); measurements on continuous cultures, when again there is a steady state; measurement of uptake over the short term by washed suspensions of (usually) log phase cells grown in unlabeled medium and suspended in labeled medium; (here uptake is best given by the rate of increase in cell quota). An empirical relation relating specific growth rate in steady state systems to nutrient status with respect to more than one nutrient simultaneously is proposed, based on three experimentally verifiable postulates: that uptake depends on the external substrate concentration; that growth depends on the internal substrate concentration; and, in a steady state system, specific rate of uptake (in absence of significant excretion) is necessarily the product of the specific growth rate and internal substrate concentration. The implications of this model are discussed, particularly to the concept of luxury consumption. (Jones-Wisconsin)
W75-02502

RESPONSES OF PHOSPHORUS LIMITED LAKE MICHIGAN PHYTOPLANKTON TO FACTORIAL ENRICHMENTS WITH NITROGEN AND PHOSPHORUS,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
C. L. Schelske, E. D. Rothman, E. F. Stoermer, and M. A. Santiago.
Limnology and Oceanography, Vol 19, No 3, p 409-419, 1974. 4 fig, 7 tab, 29 ref. AEC C00-2003-21.

Descriptors: *Phosphorus, *Phytoplankton, *Nitrogen, Lake Michigan, Limiting factors, Growth rates, Statistical methods.
Identifiers: Grand Traverse Bay(Lake Michigan).

A factorial experiment to study the effects and interactions of nitrogen and phosphorus was designed. Because the effects of nitrogen additions were small relative to those for phosphorus it was possible to use a Michaelis-Menten model to calculate growth kinetics as a function of phosphorus levels. Water from Grand Traverse Bay, Lake Michigan was used and contained phosphorus (phosphate) levels of 5, 15, 25, 40, and 60 micrograms P/l and nitrogen (nitrate) levels of 0.23, 0.84, and 1.12 mg N/l, which were maintained. Statistical analyses were based on seven samplings. Two different analyses of variance tests indicated that the responses were due to effects of phosphorus and not nitrogen. Production of chlorophyll-a at the four highest phosphorus levels was independent of concentration and could be predicted. Phytoplankton growth, measured as chlorophyll production, fitted the Michaelis-Menten model when phosphorus concentrations were adjusted to correct for chemically measurable phosphorus apparently not available to phytoplankton. Assimilation numbers and species composition were not affected greatly by the nitrogen and phosphorus enrichments. These data provide additional evidence that environmental disturbance in the Great Lakes can be assessed from qualitative phytoplankton studies. (Jones-Wisconsin)
W75-02503

THEORETICAL MODELING INVESTIGATION FOR SELF-PURIFICATION OF RIVERS (MODELLTHEORETISCHE UNTERSUCHUNGEN IUR SELBSTREINIGUNG VON FLIESS GEWASSERN),
Kernforschungszentrum, Karlsruhe (West Germany). Institut fur Angewandte Systemtechnik und Reaktorphysick.
H. Stehfest.
Available from the National Technical Information Service, Springfield, Va 22161 as KFK 16540F. Report KFK 1654 UF, August 1973. 102 p, 20 fig, 97 ref, 2 append, English abstract.

Descriptors: *Mathematical models, *Self-purification, *Rivers, Wastes, Bacteria, Protozoa, Oxygen, Thermal pollution, Sewage treatment, Computer programs, Equations.
Identifiers: Degradable wastes, Rhine River(Germany).

Different ways of representing qualitatively self-purification by systems of differential equations cannot be measured directly, but must be estimated from experimental values of the dependent variables. This is called model identification and its quasilinearization technique is recommended and explained. This technique is applied to self-purification models in some simple laboratory studies. A model is given of rivers whose benthos may be neglected. Its dependent variables are concentration of easily degradable wastes, concentration of slowly degradable wastes, bacterial mass concentration, protozoan mass concentration, and oxygen concentrition. The conditions under which this model can be identified are investigated. A self-purification model of the Rhine River between Mannheim/Ludwigshafen and the Dutch-German border is proposed. It is shown that the model is consistent with the measured data and it is used to estimate the consequences of activities such as waste heat disposal or sewage treatment. (Jones-Wisconsin)
W75-02505

CONTRIBUTION TO THE KNOWLEDGE OF PHYTOPLANKTON IN THE PROTECTED REGION OF THE SWAMPY AREA OF KOPACHEVO (KOPACKI RIT), (IN CROATIAN),
Pedagoska Akademiya, Osijek (Yugoslavia).
For primary bibliographic entry see Field 2H.
W75-02546

SOME ASPECTS OF INVESTIGATION INTO POLLUTION OF THE ENVIRONMENT WITH RADIONUCLIDES AND HEAVY METALS, (IN POLISH),
K. Smierzchalska.
Postepy Naul Roln, Vol 20, No 5, p 119-132, 1973.

Descriptors: *Radioisotope, *Heavy metals, *Radioactivity effects.

A review of the literature (40 references) pertaining to the subject matter is presented. The results of testing of atomic devices, even those built for peaceful purposes, on pollution and contamination of the environment are discussed. The specific radionuclides discussed in relation to harmful effects on the environment include Sr, Cs, I, tritium and others. Of particular interest is the contamination of waters, fish, air and vegetation, which in turn reflects on foodstuffs by humans and animals.--Copyright 1974, Biological Abstracts, Inc.
W75-02547

TECHNICAL ADVANCE IN AGRICULTURE AND SOIL PROTECTION, (IN POLISH),
For primary bibliographic entry see Field 4C.
W75-02548

TRANSACTIONAL DYNAMICS OF POULTRY MANURE IN SOIL,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
L. H. Hileman.
Paper presented at 1972 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-15, 1972, Paper No. 72-956, 15 p, 6 fig, 4 ref.

Descriptors: *Farm wastes, *Soils, *Leaching ion exchange, Ground water pollution, Calcium, Potassium, Ammonia, Manganese, Leaching, Chemical analysis, Wastes.
Identifiers: *Manure, *Transactional dynamics, Poultry wastes.

Poultry broiler manure was surface-applied to Taloka silt loam soil columns at rates of 0, 2, 4, 6, 8, 10, 20, and 40 tons per acre. The soil columns were leached with distilled water at the rate of approximately one acre inch per week for 16 weeks. The gravitationally leached water was collected for chemical analysis. Data presented indicated the intensity of dynamic transaction and cation exchange taking place in the soil due to the large application of litter. Potassium in the manure exchanged for soil calcium. Calcium in the leachate reached 800 ppm. High levels of manganese were found in the leachate. Consideration must be given to the soil and to the soil water when applying high rates of poultry manure. (Cartmell-East Central)
W75-02575

SURVEY ON WATER POLLUTION IN KOREA, (IN KOREAN),
Institute of Plant Environment, Suwon (Republic of Korea).
Y. H. Jeong, B. Y. Kim, and K. H. Han.
Res Rep Off Rural Dev (Plant Environ) (Suwon). 15: 7-13, 1973. English summary.

Descriptors: *Waste water(Pollution), *Pulp wastes, *Domestic wastes, Textiles, Dyes, Mineral industry, Refineries, *Chemical wastes, Korea mine wastes.
Identifiers: Breweries, Leather industry, Starch industry.

The general characteristics of waste water polluting cultivated fields were investigated in Korean cities and urban and rural areas. The chemical

characteristics of each sample from grouped locations were as follows: wastes from the sewage and laundry; organic wastes from paper and pulp manufacturing, leather industry, starch manufacturing, breweries, groceries and textile factories; inorganic wastes from chemical plants, dye factories and mineral refineries; wastes from nometalic and metallic mines.--Copyright 1974, Biological Abstracts, Inc.
W75-02586

GAS CHROMATOGRAPHIC ANALYSIS OF ODORS FROM DAIRY ANIMAL WASTES,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5A.
W75-02591

MERCURY AND ORGANOCHLORINE RESIDUE ANALYSIS OF FISH AND AQUATIC MAMMALS,
Freshwater Fisheries Lab., Pitlochry (Scotland).
For primary bibliographic entry see Field 5B.
W75-02594

THERMAL EFFECTS OF PROJECTED POWER GROWTH: THE NATIONAL OUTLOOK,
Hanford Engineering Development Lab., Richland, Wash.
D. E. Peterson, G. F. Bailey, S. L. Engstrom, and P. M. Schrotke.
Available from the National Technical Information Service, Springfield, Va 22161, as HEDL-TME-73-45, $5.45 in paper copy, $2.25 in microfiche. Report July 1973. 128 p, 25 fig, 24 tab, 25 ref, 4 append. AEC AT(54-1)-2170.

Descriptors: *Heated water, *Water cooling, Hydroelectric power, Thermal water, Water utilization, Pollution abatement, Water quality standards, Streams, Rivers, Model studies, Electric power, Steam, Thermal pollution.
Identifiers: *Cooling capacity, Thermal effluents.

The response of receiving waters to thermal effluent is examined and a simulation capacity applicable to waste discharges from steam generating plants is developed. Direct stream cooling capacity is assumed to consist of two components: (1) assimilative capacity--quantity of heat that can be assimilated within the constraints of stream flow and a specified temperature rise; and (2) dissipative capacity--the rate at which excessive heat is dissipated through evaporation, conduction, and radiation. The three stage simulation model begins by applying a heat budget to a given river section to calculate water temperature as a function of reduction, evaporation, conduction and advected energy. Stage two determines the maximum number of power plants with fixed direct cool heat rejection rates ranging from 800 MWT to 4400 MWT that can be placed along a stream within a given temperature constraint. Stage three involves an examination of long-term water temperature records to determine the effect that maximum temperature criteria may have on cooling capacities. Results indicate the total low flow direct cooling capacity of U.S. streams is approximately 560 GWT (gigawatts thermal), only 260 of which can be used under expected generating plans. (Schroeder-Wisconsin)
W75-02633

APPLICATION OF THE A-Z TEST IN INVESTIGATIONS ON THE INFLUENCE OF WOOD INDUSTRY RESIDUES UPON WATER AUTOPURIFICATION PROCESSES, (IN RUMANIAN),
Institutul de Medicina si Farmacia, Iasi (Rumania).
S. Apostol, and M. Filipiuc.
Rev Med Chir Soc Med Nat Iasi, Vol 76, No 1, p 113-121, 1972, Illus. English summary.
Identifiers: *A-Z tests, Algae, Bacteria, Pollution, Scenedesmus, Water quality, *Wood wastes, *Self-purification, Pulp wastes, Dissolved oxygen, *Oxygen.

The A-Z test was used in laboratory experiments for studying the influence of wood industry residues on water quality. Oxygen consumption by bacteria and oxygen production by algae added to the water were measured. Dissolved oxygen was determined after 24 hr incubation of dilutions of factory effluent, sometimes with added peptone, and of the same effluent with protococcal algae (predominantly Scenedesmus) added. In all samples studied, a high dilution of the residues (10-4-10-6) was necessary for normal development of the autopurification processes. The A-Z test was more sensitive than other hygieno-sanitary indicators used in studies on the pollution and autopurification of water.--Copyright 1973, Biological Abstracts, Inc.
W75-02640

THE USE OF FISH AS SENSORS IN INDUSTRIAL WASTE LINES TO PREVENT FISH KILLS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5A.
W75-02650

FECAL POLLUTION OF MARINE WATER, (IN RUMANIAN),
Institutul de Medicina si Farmacie, Bucharest (Rumania).
M. Zarma.
Microbiol Parazitol Epidemiol (Buchar). Vol 17, No 3, p 203-230. 1972. (English summary).
Identifiers: Bdellovibrio-Bacteriovorus, *Fecal pollution, Marine water, Mytilus-Californianus, Pollution, Protozoa, Water pollution effects, *Bacteria, Self-purification, Microorganisms.

Fecal pollution of ocean water is reviewed, including a list of various species of bacteria identified in ocean water. The chemical changes in polluted water and the technique for measuring biological contamination are described. The mode of transmission of pollution through the water to distances of 3000 m and the resistance of various species of bacteria in the marine environment are outlined. The processes of self-purification in marine water depend on chemical, physical and biological transformations, the last including bacteriovore organisms, such a Mytilus californianus and protozoa, and micropredators (e.g., Bdellovibrio bacteriovorus). Marine organisms also produce antibiotics. The pollution along the Rumaian seacoast and in Lake Techirhiol is described. Among the consequences of marine pollution are changes in the biocenotic make-up of the sea with reduction in oxygen content. The epidemiology of seaborne diseases and measures of prevention are considered. The standards necessary for bathing beaches, measures to prevent the human consumption of polluted sea-food and standards for sea products are described.--Copyright 1973, Biological Abstracts, Inc.
W75-02654

NITROGEN MOVEMENT RESULTING FROM SURFACE APPLICATION OF LIQUID SEWAGE SLUDGE,
Georgia Agricultural Experimental Station, Athens.
For primary bibliographic entry see Field 5B.
W75-02701

SEA SEDIMENTS, COSMIC RAYS, AND PULSARS,
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
For primary bibliographic entry see Field 5B.
W75-02724

ENVIRONMENTAL CONTRASTS: BLOOD LEAD LEVELS OF CHILDREN IN HONOLULU AND NEWARK,
New Jersey Coll. of Medicine and Dentistry, Newark. Dept. of Preventive Medicine and Community Health.
M. M. Joselow, J. E. Banta, W. Fisher, and J. Valentine.
Journal of Environmental Health, Vol 37, No 1, p 10-12, July-August, 1974. 4 tab, 8 ref.

Descriptors: *Lead, *Human physiology, *Distribution patterns, Human pathology, Air pollution, Analytical techniques, Spectroscopy, Hawaii, New Jersey, Pollutants, Public health, Environmental effects, Population.
Identifiers: Contaminants.

The blood lead levels of children in Honolulu and Newark were compared. Most of the housing--68%--in Newark was built before 1929, 80% of it before 1950. In Honolulu, only 20% of the housing units are older than 30 years, with the largest proportion having been built since 1960. The significance of these differences, in terms of environmental lead exposure, assumes special importance since lead-based paints were used commonly until the 1950's. The air quality data for both Newark and Honolulu with respect to particulates and lead content showed a mean value of 75 micrograms/cu m in Newark in 1972 and a mean value of 40 micrograms/cu m in Honolulu. In the two cities children were matched for age, sex, and time of sampling, and blood specimens were obtained. The mean concentration of the blood lead of Hawaiian children was about 17 micrograms/100 ml. 90% of the Hawaiian children had blood levels below 20 micrograms/100 ml, while in Newark, 75% of the children showed blood lead levels greater than 20 micrograms/100 ml; 12% of the children in Newark showed evidence of excessive intake of lead. (Jernigan-Vanderbilt)
W75-02725

LABORATORY DIAGNOSIS OF INCREASED LEAD ABSORPTION,
California Univ., Los Angeles. Dept. of Neurology.
R. W. Baloh.
Archives of Environmental Health, Vol 28, No 4, p 198-208, April, 1974. 6 fig, 4 tab, 89 ref.

Descriptors: *Laboratory tests, *Lead, *Absorption, *Analytical techniques, Human physiology, Public health, Toxicity.
Identifiers: Therapy, FEP tests, Erythrocyte porphyrin concentration, Blood lead concentration.

Blood lead concentration and free erythrocyte porphyrin (FEP) concentration were considered the two best tests for the detection and diagnosis of lead absorption. The blood test gives a measure of the dynamic body lead pool while the FEP test gives a sensitive measurement of tissue metabolic effect of increased lead absorption. Use of these tests together provides not only a useful diagnostic profile but an important index of response to therapy. Both of these tests have been used as primary screening devices with each having unique advantages and disadvantages. Future screening programs for lead poisoning may consist of a rapid determination of both lead and FEP concentration on a microcapillary blood sample. (Jernigan-Vanderbilt)
W75-02727

THE SEPARATION OF MERCURY FROM SEA WATER BY ADSORPTION COLLOID FLOTATION AND ANALYSIS BY FLAMELESS ATOMIC ABSORPTION,
Hawaii Univ., Honolulu. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-02728

A METHOD FOR THE DETERMINATION OF TOXICITY TO BACTERIA OF POLLUTANTS IN WATER AND EFFLUENT, (IN GERMAN),
Frankfurt Univ. (West Germany). Hygiene-Institut.
R. H. W. Schubert.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Aby Orig Reihe B Hyg Praev Med. Vol 156, No 6, p 545-550, 1973, English summary.
Identifiers: *Aeromonas-hydrophila, *Bacteria, Effluents, Methodology, Mutants, Pollutants, *Toxicity, Water pollution effects, Biochemical oxygen demand, Inhibition.

A multiple genetically labeled spontaneous mutant of Aeromonas hydrophila, a species which is characteristic of the effluent-surface water biotope, and which is fairly sensitive to toxic substances, is used to provide a method for testing the toxicity of pollutants to bacterial organisms. Inhibition of growth of a mutant by the pollutant in BOD dilution water, to which 0.00001% vitamin-free hydrolyzed casein is added serves as a measure of toxicity. A culture of the mutant in BOD dilution water treated with 0.00001% vitamin-free hydrolyzed casein also provides a reference value (control culture). The properties of the mutant make it possible to investigate samples of effluent or surface water, including those with high bacterial counts, in parallel with a test sample with pure pollutant.--Copyright 1973, Biological Abstracts, Inc.
W75-02734

HEALTH ASPECTS OF ARSENICALS IN THE ENVIRONMENT,
Environmental Protection Agency, Chamblee, Ga. Office of Pesticides Programs.
For primary bibliographic entry see Field 5B.
W75-02736

STUDY OF THE ROLE OF SCIRPUS AMERICANUS PERS. IN DEPOLLUTING WATERS CONTAMINATED WITH HEAVY METALS, (IN FRENCH),
Laval Univ., Quebec. Departement de Biologie.
M. Carbonneau, and J-L. Tremblay.
Nat Can (Que), Vol 99, No 5, p 523-532, 1972, Illus. English summary.
Identifiers: Bidens-cernua, *Cadmium, Contamination, Eleocharis-smallii, *Heavy metals, *Lead, *Mercury, *Scirpus-americanus, *Cyperaceae.

The capacity for S. americanus, a Cyperaceae, to concentrate the heavy metals, Hg, Pb and Cd, from its environment was studied. This plant has the capacity to act as a natural depolluting agent. Two other plants which may do the same: Eleocharis smallii Britt. and Bidens cernua L. were also studied.--Copyright 1973, Biological Abstracts, Inc.
W75-02742

DETERGENTS IN SURFACE WATERS AND THE INFLUENCE THEREOF ON MALARIA MOSQUITOES; SPECIAL STUDY ON (THE ISLAND OF) WALCHEREN,
Amsterdam Univ. (Netherlands). Lab. of Parasitology.
H. A. Van Seventer.
Identifiers: Anopheles-maculipennis-atropavus, *Detergents, Islands, *Malaria, *Mosquitoes, *Netherlands(Walcheren Island).

One of the factors that have contributed to the disappearance of malaria in the Netherlands is the pollution of small ditches, breeding places of Anopheles mosquitoes, with detergents. An LC50 for first stage larvae of A. maculipennis atropavus was attained with a concentration of 1 ppm of Teepol CH53 and an LC90 at 2 ppm. In 1968, the Dutch mosquito population had greatly receded, except on the island of Walcheren. Since then yearly studies have shown a strong decrease in the mosquito count, due to detergents and not to insecticides. This is one of the few helpful side-effects of water pollution with detergents.--Copyright 1973, Biological Abstracts, Inc.
W75-02745

THE ACCUMULATION OF ZN-65 AND OTHER RADIONUCLIDES BY TUBIFICID WORMS,
South Carolina Univ., Columbia. Belle W. Baruch Coastal Research Inst.
For primary bibliographic entry see Field 5B.
W75-02746

EFFECT OF DIETARY PROTEIN AND MAGNESIUM ON SELECTED ATP PHOSPHOTRANSFERASES AND NEUROMUSCULAR BEHAVIOR IN YOUNG RATS,
Saint Louis Univ., Mo. Dept. of Pediatrics.
J. L. Caddell, and R. E. Olson.
Journal of Nutrition, Vol 103, No 10, p 1385-1399, October, 1973. 8 tab, 2 fig, 48 ref. (HE-S672) USPHS(AM11044)+(AM16219-01).

Descriptors: *Magnesium, *Diets, *Protein, *Rodents, Behavior, Laboratory animals, Laboratory tests, Animal pathology, Enzymes.
Identifiers: *ATP phosphotransferases.

Weanling rats fed purified diets containing 0.5, 18 or 36% protein and 0.5 or 200 mg of magnesium per 100 g diet were studied, particularly in regard to neuromuscular behavior, growth, and activity of four magnesium-dependent ATP phosphotransferases. Rats fed diets limited only in magnesium (5 mg/100 g) had reduced food intake and growth and developed late edema and electrocardiogram changes. When rats were fed a diet designed to produce a state of malnutrition similar to protein-calorie malnutrition of childhood (0.5% protein, 5 mg magnesium/100 g, and 44% lactose), the plasma protein and magnesium values fell to about 50% of control values. When these malnourished animals were refed 36% protein with no added magnesium, they developed intense erythema, profound spiking of the T waves in the electrocardiogram, and 80% of them convulsed and died within 10 days; their plasma protein values had increased to 75% of control values, plasma magnesium had decreased to 20% of control values, and muscle and liver magnesium had decreased slightly. Similar malnourished rats refed 36% protein with 200 mg magnesium/100 g were clinically indistinguishable from control rats by day 60. (Jernigan-Vanderbilt)
W75-02748

5D. Waste Treatment Processes

THE SSP-BELT FILTER FOR THE DEHYDRATION OF COMMUNAL AND INDUSTRIAL SEWAGE SLUDGES (DAS SSP-BANDFILTER ZUR ENTWASSERUNG KOMMUNALER UND INDUSTRIELLER SCHLAMME),
E. E. Emrath.
Wasser Luft und Betrieb, Vol 18, No 3, p 154-157, 1974. 2 fig, 3 tab.

Descriptors: *Dehydration, *Dewatering, *Sludge, Equipment, Pressure, Industrial wastes, Domestic wastes, Vacuum, Oil, Odors, *Filters, *Waste water treatment, *Sewage sludge, Filtration, Flocculation.
Identifiers: Band filter, Suction, Sifting, Sludge dewatering.

A new sludge dewatering machine is described, the SSP band filter, whose initials indicate the process of sifting, suction and pressing, performed by the band filter. The arriving sludge is mixed intensely with flocculants. Cationic flocculants usually lead to good results with most sludges, the molecular weight and the amount of cationic substance being of major importance. With certain industrial sludges the use of anionic flocculants brought better results. In some cases only the combination of two flocculants brings the desired results. The sludge which has been mixed with adequate flocculant passes to the sifting band by way of a distributor. The sifting band glides over a perforated synthetic plate. The mesh width of the sifting band should match the size of the sludge flake. The band proceeds with the sludge to the sifting zone where the free water flows off. In the suction zone a slight vacuum prevails. Here the sludge is dewatered to the extent that the sludge layer contacting the band is dry while most of the fine water is removed from the top layer. In the following pressing zone the water from the sludge surface is pressed out. The throughput varies greatly and depends on the kind of sludge to be dewatered. If sodium perchlorite is to be added for deodorization the flocculant consumption will rise. (Prague-FIRL)
W75-02201

POLLUTION TROUBLE SHOOTING THEIR JOB,
J. Marsh.
South African Chemical Processing, p 20-21, December 1973/January, 1974.

Descriptors: *Reverse osmosis, *Desalination, *Potable water, *Research, Separation, Industrial wastes, Waste water treatment, Treatment facilities, Application methods.
Identifiers: Pollution Research Group, *South Africa(Natal University), Ultrafiltration.

Fundamental and practical application concerning pollution and projects currently ongoing by the Pollution Research Group of the Chemical Engineering Department at the University of Natal are described. Various doctoral candidates have been allotted time and facilities to carry out research. The most recent work has to do with the reverse osmosis process for desalination. Applications include the use of the reverse osmosis separation process (and the ultra filtration process) as a technique for the separation and concentration of fractionation of substances in fluid solution, particularly industrial waste water. Also, basic principles of RO are being studied for suitable research by physical chemists for future doctoral degrees. (Prague-FIRL)
W75-02202

HELPING HAND WITH POLLUTION PROBLEMS.
Rohm and Haas Reporter, Vol 32, No 1, p 21-23, Spring, 1974.

Descriptors: *Planning, *Waste water treatment, *Liquid wastes, *Ion exchange, *Flocculation, *Adsorption, Costs, Municipal water, Industrial wastes, Regulation, Air pollution, Water pollution, Kraft mill wastes, Contracts.
Identifiers: Fluid process services, Liquid extraction.

A new service program has been set up by the Rohm and Hass Company in Philadelphia called Fluid Process Service. Chemists, technicians, and design engineers work on a contractual consulting basis to solve specific problems in the areas of ion exchange, flocculation, adsorption, and liquid extraction. The treatment processes used vary by location, method of reuse of recovered materials, costs, and local air and water pollution regulations. An example of the FPS was a kraft paper mill, but this service has been extended to meet the needs of municipal water supplies as well as industrial concerns. (Prague-FIRL)
W75-02203

WATER TREATMENT: HOW TO TOP EVEN GOVERNMENT STANDARDS,
Holley, Kenney, Schott, Inc., Pittsburgh, Pa.
T. Synott, J. C. Williams, and E. D. Escher.
Factory, Vol 7, No 4, p 47-50, April, 1974. 2 fig.

Descriptors: *Water treatment, *Municipal water, *Industrial wastes, *Water quality standards, *Waste water treatment, Costs, Industrial water, Cooling water, Toxicity, Sewers, Mixing, Discharge, Automation, Alum, Coagulation, Water softening, *Indiana, *Water reuse.
Identifiers: Sanitary sewage system, Batch process, Walesboro(Ind).

Water treatment at the Cummins Engine Company plant in Walesboro, Indiana was recently designed to consider all possibilities for innovation, saving considerable amounts of money. The quality of water effluents at this diesel components plant is higher than both state and federal standards. The main industrial usage is cooling water, process, wet scrubbing and coolant and wash tank water. Water consumed by the plant must be purchased from the municipal supply of Columbus, Indiana, and waste waters produced would be discharged into the city's sanitary sewage system. By processes of cooling at higher cycles, water softening, direct discharge to sewers of rinses without toxic substances, and scrubbing and filtering of exterior exhausts, quality was improved and quantity of water consumed (by the plant) reduced. Effluent waste treatment facilities were built for a batch process. In the system of chemical treatment, alum was chosen as primary coagulant. The plant has both sanitary and process water sewer systems; accidental discharge of wastes are prevented from entering the city's sewage plant. Automation has been built into the feed systems as much as possible. After final design, the monthly consumption of municipal water is 16 million gallons, compared with the original estimate of 25 million gallons per month, or 40 percent reduction. (Prague-FIRL)
W75-02204

ECOLOGY PROBLEMS SPELL PROFITS,
Associated Construction Publications, Elmhurst, Ill.
L. Roth.
Engineering and Contract Record, Vol 87, No 3, p 54-56, March, 1974.

Descriptors: Equipment, *Domestic wastes, *Waste water treatment, Systems analysis, Treatment facilities, Highways, Salt, Chemicals, Erosion, *Florida, Ecology.
Identifiers: Street sweeping.

Although equipment, materials, and fuels have undergone shortages, small scale firms for ecological protection have managed to be successful. A treatment system is described whereby a small aerobic plant may be used to service individual apartment buildings and their domestic wastes. About 240 such systems have been installed in Florida in areas where building had been stopped because of inadequate municipal facilities. Another service described is that of system evaluation, consultants to consultants. A third service is that of a professional sweeping company for streets, major shopping areas, low gutters, and along fences. Additionally, practical uses of median strips and sideslopes along highways has been proposed, whereby trees planted can be a source of future pulpwood. Related to this is research on the effect of salt and highway chemicals on roadside vegetation with the suggestion that salt-resistant grasses be grown, and that erosion-preventing wood chips be used in areas of clearing operations. (Prague-FIRL)
W75-02205

CONTROL OF COLIFORM IN A SULPHITE MILL AERATED STABILIZATION BASIN,
Crown Zellerbach Corp., Camas, Wash. Microbiological Research.
S. H. Watkins.
Paper Trade Journal, Vol 158, No 17, p 28-30, April 29, 1974.

Descriptors: *Coliforms, *Sulfites, Public health, *Chlorination, Industrial wastes, Water pollution, Water supply, Toxicity, Pre-treatment(Water), *Waste water treatment, Filters, Effluents, *Aerated lagoons, *Sewage treatment.
Identifiers: Multiple fermentation tubes, Membrane filters, Modified chlorination.

High concentrations of coliforms in the effluents of Lebanon, Oregon were due to their development at early stages rather than growth during secondary treatment. When a high background level of coliforms is present from industrial wastes, it becomes difficult to detect pollution from sources of known public health significance. The method here was to kill coliforms in the incoming wastes on a small scale. A modified chlorination system, employing caustic injection into the chlorinator's water supply was the most effective treatment found. Bioassays and chemical analyses proved that no toxic chlorine residuals resulted. Methods for testing were the Multiple Fermentation Tube and the Membrane Filter. Pretreatment was found to be a practical way to kill coliforms and obtain secondary effluents with acceptable levels of the coliforms. The modified chlorination processes may have other applications when more opportunities to optimize the process are discovered. (See also W74-06520) (Prague-FIRL)
W75-02206

THE LAND CAN BE RETURNED.
Water and Pollution Control, Vol 112, No 4, p 18-19, April, 1974. 1 tab, 4 ref.

Descriptors: *Sewage sludge, *Waste disposal, Crop production, Farm management, Nitrogen, Corn(Field), Sludge treatment, Farm wastes, Solid wastes, Zinc, Cadmium, Lead, Metals, On-site tests, *Canada, North America, Fertilizers, Domestic wastes, *Waste treatment.

Research at Guelph University in Ontario, Canada includes field trials directly incorporating shredded garbage onto land alone, or in combination with sewage sludge and poultry manure, and the application of lime, alum, and iron-precipitated sludges. Corn crops were then planted. Results in terms of corn yields and soil nitrate-nitrogen distribution during the tests have been promising. A general summary of the data shows: a sludge application of 0.5 acre-inches was sufficient to produce 112 bu/acre corn; up to 30 percent of the total nitrogen applied as sewage sludge remained in the cultivated soil layer as residual solids; zinc levels were highest in treatment involving solid waste or poultry manure; the greatest cadmium level found in the corn stover from the highest application of milled refuse and sludge; maximum lead level in corn grain was related to the treatment of milled refuse plus poultry manure; and, levels of metals in crops of corn and rye after one application of waste did not appear to reach toxic concentrations. (Sandoski-FIRL)
W75-02210

PICKLING PROCESS POLLUTION PROBLEM 'ELIMINATED'.
The British Steelmaker, Vol 40, No 1-2, p 38, January-February, 1974.

Descriptors: *Acids, *Heavy metals, *Industrial wastes, Water pollution control, Sulfates, Waste water treatment, Europe, Steel, Stainless steel.
Identifiers: Metal processing, Sweden, Pickling process.

A new process which permits the recovery of up to 99 percent of acids and heavy metals from pickling baths used in metal processing plants has been developed in Sweden. The method rests upon fluid extraction which provides for sulfuric acid to be added to the nitric and hydrofluoric acids in the pickling bath. The bulk of the latter two are separated from the solution, returned to the pickling process, and the remaining aqueous solution of metal sulfates are recovered in the form of dry oxides. The only remaining material is a residual amount of sodium sulfate. (Sandoski-FIRL)
W75-02212

PROCESS FOR FLOCCULATING SOLID PARTICLES FROM AN AQUEOUS SUSPENSION THEREOF,
Firestone Tire and Rubber Co., Akron, Ohio. (assignee)
F. J. Webb, and D. P. Tate.
United States Patent 3,801,500. Issued April 2, 1974. Official Gazette of the United States Patent Office, Vol 921, No 1, p 305, April, 2, 1974.

Descriptors: *Patents, *Solubility, *Polymers, Ammonium, *Flocculation, Solids, Suspensions, *Sewage treatment, *Waste water treatment, Aqueous solutions.
Identifiers: Water-soluble polymers, Vinyl, Anti-Markownikoff process, Hydrogen bromide.

The process for preparing water-soluble polymers from polydienes having a substantial amount of repeating units with pendent vinyl groups, such as highvinyl polybutadiene is explained. The process involves the anti-Markownikoff addition of hydrogen bromide to the pendent vinyl groups to give the primary bromide derivative groups, which upon the addition of a tertiary amine, give quaternary ammonium groups. These impart water solubility to the polymers. The products are particularly useful for the flocculation of solids from suspensions such as elutriated sewage. (Prague-FIRL)
W75-02216

METHOD AND APPARATUS FOR TREATING WASTE PRODUCTS,
Fluid Energy Processing and Equipment Co., Hatfield, Pa. (assignee)
N. N. Stephanoff.
United States Patent 3,802,089. Issued April 9, 1974. Official Gazette of the United States Patent Office, Vol 921, No 2, p 469, April, 1974. 1 fig.

Descriptors: *Patents, *Industrial wastes, *Sewage treatment, *Dehydration, Equipment, Heat, Energy, Temperature, Gases, Separation, Centrifugation, *Waste water treatment, *Farm wastes.

The treatment of sewage, industrial waste, and other vegetable and animal wastes by drying and dehydrating this waste material in a fluid energy drying apparatus is accomplished. An illustration indicates the way that the waste matter is subjected to the heat energy of high-temperature gases while being whirled through a curved path, where dried particles are centrifugally separated from the less-dried particles. (Prague-FIRL)
W75-02217

SOURCE CONTROL KEY TO WASTE SYSTEM,
W. A. Chapman.
Water and Wastes Engineering, Vol 11, No 3, p B-20-B-22, March, 1974.

Descriptors: *Industrial wastes, *Municipal wastes, *Waste water treatment, *Water pollution control, Septic tanks, Waste disposal, Treatment facilities, *California, Planning, Chemical wastes.
Identifiers: *Chemical treatment, Septic tank sludge, Palo Alto(Calif).

The city of Palo Alto, California, considers source control to be the basis of its program to treat industrial wastes. Industrial disposal problems were anticipated by the city, and an industrial waste treatment works was designed and built at the waste water treatment plant. Concentrated chemical wastes and septic tank sludge will be transported by truck to this facility for special treatment and disposal. A questionaire was sent to 68

businesses in the area to ascertain monthly volumes of deleterious wastes they produce and interest in a pick-up and disposal service. On the basis of their response the treatment plant was planned, and proposed rules were drafted. (Prague-FIRL)
W75-02218

VACUUM FILTRATION EQUIPMENT INNOVATIONS,
Stockdale Engineering Ltd., Macclesfield (England).
R. Bosley.
Filtration and Separation, Vol 11, No 2, p 138-148, March/April, 1974. 31 ref.

Descriptors: *Design criteria, Equipment, *Filters, *Vacuum drying, Construction costs, Construction materials, Drying, Discharge, *Waste water treatment, *Filtration.
Identifiers: *Vacuum filters, Cake washing, Filter media.

Recent developments were made in the design and application of all types of vacuum filters. Equipment dealt with includes rotary drum, rotary disc, rotary table, rotary multi-tipping pan filters, single tipping pan, linear belt and other cake filters. Rotary drum precoat, and other media type vacuum filters were described. The cost and influence on design of new materials of construction for vacuum filtration equipment is reviewed. The mechanical design and features of very large vacuum filters (drum filters of 150 sq m and disc filters of 5 m diameter), and the development of automatic control systems for vacuum filtration equipment, were considered. The influence of improved mechanical design features on processing, including cake washing, drying, discharge systems and filter cloth washing techniques is discussed. New process applications can now be economically handled by vacuum filtration because of wider range of equipment, improvements in design, new materials of construction, and new filter media. (Prague-FIRL)
W75-02219

REMOVAL OF AMMONIA FROM RIVER WATER,
Water Research Association, Marlow (England). Treatment Group.
C. S. Short.
Water Services, Vol 78, No 937, p 81-85, March, 1974. 10 fig, 2 tab, 3 ref.

Descriptors: Costs, *Ammonia, *Capital costs, *Operating costs, Chlorination, *Sedimentation, *Filtration, Methodology, Pilot plants, *Waste water treatment, *Biological treatment.
Identifiers: *Ammonia removal, Pilot investigations, Biological filtration, Biological sedimentation, Breakpoint chlorination, *Air-stripping process.

An evaluation of the performance and costs of ammonia removal processes was undertaken by the Water Research Association (WRA) as part of research into problems of river water quality. Pilot-scale investigations of three promising processes--biological sedimentation, biological filtration and air-stripping--were carried out over a period of 18 months. Capital and operating costs of these processes and of breakpoint chlorination were estimated. Biological sedimentation was found to be effective and considerably cheaper than the alternative processes. (Prague-FIRL)
W75-02220

DEEP BED AUTOMATIC CARBON FILTER IN OPERATION.
Koppers Co., Inc., Pittsburgh, Pa. Environmental Systems Div.
Water and Sewage Works, Vol 121, No 4, p 40, April, 1974.

Descriptors: *Filters, *Automation, Maintenance, *Costs, *Sand, Carbon, *Waste water treatment, Filtration, Water purification, *Carbon filters, Filtering systems, *Massachusetts.
Identifiers: *Automatic backwash carbon filters, Backwashing, Filter media, Amesbury(Mass).

The town of Amesbury, Massachusetts has the first deep bed (48 inch media depth) automatic backwash carbon filter (ABW). This type of filter eliminates costly time of maintenance and permits automatic cleaning of the filter media without interrupting the water processing. Filter media of either sand or granular carbon are available; carbon controls tastes and odors better. The ABW filter bed operates in the following manner: clean filtered water is forced up through one cell, sweeping particulate matter into a hood which is suspended from the automated carriage above the cell; washwater is discharged to waste; as the carbon media is cleaned, the hood and carriage move to an adjacent filter cell; and while one cell is being backwashed, the others continue to filter. (Prague-FIRL)
W75-02221

SHORTAGES: WATER POLLUTION CONTROL FACILITIES FACE THE CRISIS,
J. T. Sliter, and P. S. Ward.
Journal Water Pollution Control Federation, Vol 46, No 4, p 616-622, April, 1974.

Descriptors: *Waste water treatment, *Energy, *Fuel, Oil, Chlorine, *Methane, Recycling, Costs, Materials, Sludge, Resources, Anaerobic digestion, Water pollution control, Treatment facilities, Gases, *Incineration.
Identifiers: *Digester gas, *Sludge gas, Energy shortages.

Waste water treatment plants are faced with recent shortages of energy and materials. Uncertainty about delivery times for fuel and its availability for running sludge incinerators has created crises in several areas of the United States. In addition, materials to build and operate the plants are in demand, and costs are a particular problem. This holds true for high prices of not only oil and gas but also chlorine. One remedy proposed for fuel shortages is the use of methane gas generated by anaerobic digestion of waste water sludge. The concept of digester gas was used previously and has already been instituted at several plants, at least as a supplementary resource. (Prague-FIRL)
W75-02222

NEW DEVELOPMENTS IN FILTER PLATES AND FILTER PRESSES,
Fletcher Filtration Ltd., Mirfield (England).
G. B. Cherry.
Filtration and Separation, Vol 11, No 2, p 181-192, March/April, 1974. 3 fig.

Descriptors: *Filters, *Automation, Labor, Equipment, Treatment facilities, Plastics, *Waste water treatment, *Filtration.
Identifiers: *Filter presses, *Filter plates, Cake removal.

The whole concept of filter press utilization has changed because of innovative mechanical developments and a reduction in manual labor requirements. Cleanliness of operation has been achieved by using rubber moulded plates with a high degree of compressibility, and synthetic cloths sealed on the gasket surface. Good cake release properties without leakage have resulted as well. The interaction of press plate size, cake thickness, dead time for opening, closing, and cake removal and labor utilization were improved with the transition from manually to automatically operated plate and frame presses. (Prague-FIRL)
W75-02223

CATFIELD, LUDHAM, AND POTTER HEIGHAM SEWERAGE AND SEWAGE PURIFICATION WORKS,
Dosser (John) and Partners, Worcester (England).
K. W. Whimster.
Water Services, Vol 78, No 937, p 77-79, March, 1974. 5 fig.

Descriptors: *Sewage treatment, *Treatment facilities, Water purification, Waste disposal, Solid wastes, Liquid wastes, Dewatering, Sludge, *Waste water treatment.
Identifiers: *Vacuum filtration plants, Tipping, *United Kingdom(England).

A new sewerage and sewage purification system was opened which serves three villages in the Norfolk Broads region of England. The area needed this additional facility to accomodate a summer population of about 9000 visitors as well as the residents. The purification works are conventional in their treatment methods, removing solid matter and oxidizing the liquid. Solids are disposed of on land and the liquid is discharged to the river. Sludge is dewatered by a rotating disc vacuum filtration plant and disposed of to farmers or tipped. (Prague-FIRL)
W75-02224

SELF-CONTAINED SAMPLING AND MEASUREMENT SYSTEM FEATURES RESPIROMETER.
Robertshaw Controls Co., Richmond, Va.
Water and Sewage Works, Vol 121, No 2, p 53, February, 1974.

Descriptors: *Sampling, *Measurement, *Municipal wastes, Industrial wastes, Biochemical oxygen demand, Aeration, Clarification, Dissolved oxygen, Bacteria, Monitoring, Toxicity, Cleaning, *Waste water treatment, Pollutant identification.
Identifiers: *Respirometers.

A self-contained sampling and measuring system for use in waste water treatment operations has been introduced by Robertshaw Controls Company. It utilizes a continuous bacterial respirometer and is designed to provide municipal and industrial sewage treatment plant operators with continuous information concerning the treatment process. The on-line data provided by the respirometer is convertible to biochemical oxygen demand (BOD) values. A waterproof enclosure houses the respirometer which samples from the aeration basin or primary clarifier effluent. The sample is aerated and metered through an internal residence chamber at a constant rate. The differential oxygen utilized by the active bacteria throughout the system is sensed by dissolved oxygen sensors located at both ends of the residence chamber. Toxic or inhibitory materials which adversely affect the bacterial metabolism are identified readily. The system has an automatic cleaning cycle which prevents bacterial growth within the system. (Prague-FIRL)
W75-02225

HEAPS AND HOLES.
Surveyor, No 4261, p 10-11, February, 1974. 2 fig.

Descriptors: *Planning, *Waste disposal, *Model studies, *Computer models, *Water pollution, Mineral industry, Treatment facilities, Public health, Costs, Hydrogeology, Landscaping, Pretreatment(Water), *Waste water treatment.
Identifiers: *Mineral extraction, Land reclamation.

Planning links between waste disposal, land reclamation, and mineral extraction are needed for future disposal facilities. A pilot study for a computer model, as well as its limitations, is described. Strategy was defined as factors needed to arrive at a marginal value for waste disposal. This was given in terms of the wastes considered, the holes

available, the environmental constraints on which types of wastes can go into which holes, and the pre-treatment of the wastes. Water pollution standards, risks to public health, and location of sites were considered in the model. From the computer results, attractive holes can then be reassessed. Real figures would be given in the form of a detailed hydrogeological survey, estimates of costs, landscaping, access, and screening, and safety with respect to water pollution. Planning decisions for mineral workings in a particular area could then be made. (Prague-FIRL)
W75-02232

MAKING POLLUTION CONTROL EASIER: PART 2 - WATER TREATMENT AND CONTROL,
General Electric Co., Schenectady, N.Y. Environmental Protection Operation.
J. A. Bacchetti.
Automation, Vol 21, No 5, p 56-60, May, 1974. 1 tab.

Descriptors: *Legal aspects, *Federal Water Pollution Control Act, Regulation, Design criteria, *Treatment facilities, Methodology, Heavy metals, Nutrients, Water pollution, Flow control, Inorganic compounds, *Water Pollution Control.

A brief description of the legal aspects cited from the Federal Water Pollution Control Act, 1972 Amendment is given together with regulations now being proposed and promulgated by the Environmental Protection Agency to implement this water act. Design criteria for treatment facilities and methodology must be consistent with present and future regulations always operating within specification and consistent with the daily effluent standards specified in the permits. Such criteria are explored for the following potential pollutants: heavy metals and other inorganics, nutrients, and water flow regulation. (Sandoski-FIRL)
W75-02233

POSSIBILITIES AND LIMITATIONS IN THE COMBINED PURIFICATION OF DOMESTIC AND INDUSTRIAL WASTE WATERS (MOGLICHKEITEN UND GRENZEN DER GEMEINSAMEN REINIGUNG HAEUSLICHER UND GEWERBLICHER ABWAESSER),
K. R. Irhoff.
VDI-Berichte, No 207, p 93-101, 1973.

Descriptors: *Domestic wastes, *Industrial wastes, *Waste water treatment, *Costs, Pretreatment, Sewer systems, Nutrients, Aeration, Biological treatment, Chemical treatment, Precipitation.
Identifiers: *Joint treatment(Municipal/Industrial), *Combined treatment.

Possibilities and limitations of the combined treatment of domestic and industrial waste waters are discussed. Joint treatment is economically motivated by the fact that the specific costs of treatment sharply reduce with increasing throughput capacities, especially up to 100,000 inhabitant equivalents. The combined treatment creates no particular problems provided that the industrial waste waters are non-toxic and their share does not exceed 30 percent of the total volume to be treated. Most industrial waste waters require mechanical-chemical pre-treatment, such as precipitation and neutralization prior to their discharge into the municipal sewer system. The addition of industrial waste water is also essential for establishing purification. Waste waters that are too concentrated should be treated anaerobically rather than by the aeration method due to the limit capacity of the latter. Special waste waters may require two-stage biological purification with separate sludge systems and different kinds of bacteria. Examples demonstrating the combined purification of domestic and pre-treated industrial waste waters are presented. (Prague-FIRL)
W75-02234

THE ABC PROCESS FOR IMPROVING THE TREATMENT OF WASTE WATERS (LE PROCEDE ABC, POUR AMELIORER LE TRAITMENT DES EAUX RESIDUAIRES),
J. F. Kerl.
Revue Generale Des Matieres Colorantes-Teintex, No 2, p 75-77, 1974. 2 ref.

Descriptors: *Waste water treatment, *Textiles, *Biological treatment, *Chemical wastes, Aeration, Recycling, Activated sludge, Municipal wastes, Industrial wastes, Costs, Equipment, Biochemical oxygen demand, Suspended solids.
Identifiers: *Biological-chemical treatment, Phosphorus removal.

An integrated biological-chemical waste water treatment process is described with respect to its applications in the textile industry. Raw waste water treatment by short detention aeration in a biological reactor in the presence of activated sludge followed by rapid sedimentation and sludge recycle in a chemical separator is explained by citing studies utilizing mixed municipal and industrial sewage. Advantages of the patented Accelerated Biological-Chemical (ABC) process include economic considerations of short aeration detention times and reduced land and equipment requirements, as well as technical advances of high BOD, suspended solids, and phosphorus removals with superior performance under shock loading and transient conditions. (Prague-FIRL)
W75-02235

TOTAL WASTE RECYCLE SYSTEM FOR WATER PURIFICATION PLANT USING ALUM AS PRIMARY COAGULANT,
Rensselaer Polytechnic Inst., Troy, N.Y.
L. K. Wang, and J. Y. Yang.
Calspan Project Report No ND-5252-M-1, May 1974. 33 p, 7 tab, 4 fig, 34 ref.

Descriptors: *Waste water treatment, Water quality, Waste treatment, Filters, Sludge, *Recycling, *Water reuse, *Water purification, *Coagulation, Filtration.
Identifiers: *Alum sludge, Jar tests, Waste sludge characterization, Waste water characterization, Wastes recovery.

A total recycle process was designed to provide a cost-effective system for achieving 'zero' waste discharge from a water purification plant. It has been demonstrated that the recycle of filter washwater as raw water supply can be achieved without difficulty. The recovery of waste alum sludge by both acid (sulfuric acid) and alkaline (sodium hydroxide) treatment and the reuse of recovered alum for water purification have also been demonstrated to be technically feasible.
W75-02239

MANURE AND WASTE PROJECTS ON DAIRY FARMS,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
L. A. Brooks, and T. J. Brevik.
Paper No 73-5543 presented at 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973. 14 p, 23 fig.

Descriptors: *Farm wastes, *Cattle, *Dairy industry, Lagoons, Waste disposal, Design, *Wisconsin, Waste storage, Experimental farms, *Waste treatment.
Identifiers: Milking parlor wastes.

Many waste management problems are currently facing Wisconsin dairy farmers. Over 90% of the dairy farms in Wisconsin have less than 50 cows, and this fact prevents installation of elaborate and expensive waste disposal systems. What is needed is a low cost, but effective, means of handling dairy waste. In coordination with the University of Wisconsin, three low cost solid manure storage facilities were installed on private farms. The storage areas vary in size and construction, and each site cost $1,000 or less. From these projects, it is hoped, will come some of the answers to waste management. Another area of concern is milking parlor waste disposal. Most farmers use a conventional septic tank disposal system for discharging parlor wastes, but this hasn't proved effective. In 1972, University of Wisconsin Agricultural Engineers designed experimental disposal methods to be employed on private farms. Three farms installed disposal lagoons; two farms installed ridge and furrow disposal systems; and two shallow disposal beds were installed on another farm. Data obtained from these facilities during the next few years will determine their usefulness for waste management. (Russell-East Central)
W75-02241

FRACTIONATION OF A CHICK GROWTH DEPRESSING FACTOR FROM RYE,
Washington State Univ., Pullman. Dept. of Animal Science.
R. Fernandez, E. Lucas, and J. McGinnis.
Poultry Science, Vol 52, No 6, p 2252-2259, November 1973. 5 tab, 16 ref.

Descriptors: *Poultry, *Diets, *Growth rates, *Farm wastes, Ethers, Swine, Feeds, Performance, *Waste treatment, Dehydration.
Identifiers: *Fractionation, *Growth depressing factor, *Rye, Acetone.

Four experiments were conducted to study the nature of chick growth depressing factor or factors present in rye. Chicks were fed acetone extracted rye. Day-old chicks were used in all experiments. Results obtained in Experiment 1 showed that the acetone extraction of rye did not remove the chick growth depressing factor. The results of Experiments 2, 3, and 4 consistently indicated that the fraction of rye that contains most of its chick growth depressing properties and also contains the factor causing sticky droppings associated with feeding rye to young birds can be removed by a simple water extraction. Experiment 2 gave a clear indication that feces stickiness by itself was not deleterious to chick growth and that this effect was caused by a factor that was different from the one that causes growth depression. (Cartmell-East Central)
W75-02242

DEHYDRATED POULTRY WASTE AS A FEED FOR MILKING COWS AND GROWING SHEEP,
Michigan State Univ., East Lansing. Dept. of Dairy Science.
J. W. Thomas, Yu Yu P. Tinnimitt, and H. C. Zindel.
Journal of Dairy Science, Vol 55, No 9, p 1261-1265, 1972. 4 tab, 8 ref.

Descriptors: *Farm wastes, *Poultry, *Feeds, *Cattle, Sheep, Dairy industry, Waste disposal, *Recycling, Diets, Performance, *Waste treatment, Dehydration.
Identifiers: *Dehydrated poultry wastes, Refeeding.

Milking cows and fattening sheep were fed dehydrated feces from caged layers to determine its value as a feed and protein source. The milking cows were fed manure that would provide for 23% of the total dietary protein and 11% of the total dry matter. The sheep were fed manure to provide for 61 or 90% of total protein and 25 or 50% of total feed. The cows fed this ration produced equal amounts of milk as those fed a normal ration. Sheep gained less when fed the feces than they did when fed the normal ration. However, carcass grade of the sheep fed 25% feces was equal to that of those fed normally. The main advantage of feces is the cost. Dehydrated manure costs only $20 per 908 kg. The results show that it is feasible and economical to use manure as a feed ingredient

and energy source for cows and lambs. (Russell-East Central)
W75-02243

THE EFFECTS OF LIMITED AERATION ON THE ODORS OF LIQUID DAIRY MANURE,
Idaho Univ., Moscow.
K. D. Vickers.
M.S. Thesis, 1972, 67 p, 13 fig, 7 tab, 24 ref.

Descriptors: *Aeration, *Odor, *Liquid wastes, *Farm wastes, *Dairy industry, *Slurries, Chemical oxygen demand, Amino acids, Sampling, Hydrogen ion concentration, Ammonia, Nutrients, *Waste water treatment.

The best aeration volume that would reduce odors in liquid dairy manure storage pits without losing nutrient value in the slurry was studied. Initial tests used the volume of air that would reduce the Chemical Oxygen Demand by 10% at an 8% oxygen transfer efficiency. Two runs were then made using substantial air volume reductions. A fourth run was made without any aeration. As the aeration volume was reduced the odor increased. No nutrient loss occured in any of the experiments during which air was supplied to the manure slurry. During the experiments the manure slurry was monitored for oxidation reduction potential, drainability, ammonia, Kjeldahl nitrogen, volatile acids, oxygen, methane, pH, odor value, COD, total and volatile solids, and total phosphorus. (Russell-East Central)
W75-02245

PRIORITIES IN SELECTING DAIRY FACILITIES,
Kentucky Univ., Lexington.
G. M. Turner.
Paper No 72-415, presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972. 20 p, 1 tab.

Descriptors: *Feed lots, *Investment, *Priorities, *Facilities, *Dairy industry, *Costs, Land, Silage, Feeds, Planning, Cattle, Kentucky, Waste storage, Waste disposal, *Waste treatment.
Identifiers: Manure handling, Feed storage, Field machinery.

The reason for establishing priorities for dairy facilities is to determine which facilities are absolutely necessary in order for a maximum profit return of each investment to occur. The facilities are divided into two groups, (1) essential, and (2) additional. The essential facilities must be available before milk production can start and continue. The additional facilities lessen the time and labor load, but the margin of profit return is not as great. Each type of facility described. Economics of investment of each facility is discussed. The cost figures are averages from dairy farms on Kentucky Farm Analysis programs. (Cameron-East Central)
W75-02246

SEPTAGE: WASTES PUMPED FROM SEPTIC TANKS,
Connecticut Univ., Storrs. Dept. of Agricultural Engineering.
J. J. Kolega, B. J. Cosenza, A. W. Dewey, and R. L. Leonard.
Transactions of the ASAE, (American Society of Agricultural Engineers) p 1124-1127, 1972. 4 fig, 1 tab, 5 ref.

Descriptors: *Domestic wastes, *Waste treatment, *Septic tanks, *Sampling, Volume, Biochemical oxygen demand, Chemical oxygen demand, Physical properties, Chemical properties, Microbiology, Microorganisms, Costs, Bacteria, Hydrogen ion concentration, Odor, Color.
Identifiers: *Septage, Concentration ratio.

Septage disposal problems and feasible solutions vary among communities. Samples were taken from truck loads of septage brought to the Metropolitan District Commission, East Hartford, Connecticut Water Pollution Control Facility. Each sample collected was identified as to its purpose, i.e., bacteriological or physical-chemical. The following septage analyses were conducted: biochemical oxygen demand, chemical oxygen demand, pH, settleable solids, total solids, volatile solids, suspended solids, free ammonia, and organic nitrogen. Physical and visual observations were used for recording data on odor and color. Chemical and physical observations and results are discussed. When a state-wide septage disposal system is being planned or when a single disposal facility is being designed, septage volume estimates by area should be known. The costs per unit of volume for treating septage at a water pollution control facility are approximately 17 times the costs of treating sewage of the same volume. (Cameron-East Central)
W75-02247

NEW CONCEPT CUTS FOR BEEF CONFINEMENT,
D. Peach.
Farm Building News, Vol 7, No 4, p 1, 24-25, July-August, 1973. 6 fig.

Descriptors: *Confinement pens, *Cattle, *Costs, *Farm wastes, Economics, *Waste treatment, Lagoons, Waste storage, Design.
Identifiers: *Beef, Flume and flush system.

Plans for a beef confinement building with a new floor concept which may drastically cut the cost of the confinement feeding system have been developed by Iowa Beef Processors, Dakota City, Nebraska. The new concept eliminates the digging of a manure pit, the pit walls and floor, and the slats, replacing them with 2 inch slots and flumes under the concrete floor to catch the manure. The manure is then flushed to a lagoon. The estimated cost of such a system is about $70 per head capacity. The floor is sloped to permit draining, the distance a feeder could flush manure is unlimited. The recommended confinement barn would vary from 24 to 40 ft. of cattle space, measuring from a feed bunk in one end to the other end. Further refinements are necessary, and experimentation is being conducted so that it is highly probable that confinement feeding can be accomplished for $70 per head or less in the near future. (Russell-East Central)
W75-02248

PILOT WASTE CONTROL AND ITS EFFECT ON POULTRY LITTER,
Texas A and M Univ., College Station. Dept. of Poultry Science.
W. F. Krueger, J. Bradley, and W. Milberger.
September, 1973. 8 p, 6 tab.

Descriptors: *Poultry, *Litter, *Farm wastes, Odor, Larvae, Larvicides, *Waste treatment, Density, Quality control, Sampling, Air pollution.
Identifiers: *Pilot Waste Control, Manure, Fly control, Chemical treatment.

Odors and manure volume can be serious problems in cage layer and other types of poultry operations. Chemical treatment of manure may offer some relief for odor problems. A pilot study was initiated March 12, 1973, to evaluate Pilot Waste Control, a chemical with potential odor control properties. The objectives were: to study the effect of chemical treatment of manure on odor; to determine the effect of litter treatment on manure density and quality; and to determine the number of treatments required to control odor and manure quality. Recommendations were: (1) apply Pilot Waste Control to litter cones on a biweekly basis using the lowest recommended dilution rate; (2) add a larvicide to control fly larva; (3) use noncorrosive equipment when applying the chemical to litter; and (4) begin treatment when pullets are housed and continue through spring and early summer. (Russell-East Central)
W75-02249

NUTRIENT RECYCLING BY LAYING HENS,
Texas A and M Univ., College Station. Dept. of Poultry Science.
J. H. Quisenberry, and J. W. Bradley.
Feedstuffs, Vol 41, No 5, p 19, February 1, 1969. 7 tab, 1 ref.

Descriptors: *Recycling, *Nutrients, *Waste treatment, Farm wastes, Waste disposal, Drying, Litter, Performance, Poultry, Feeds, Taste, Costs.
Identifiers: *Refeeding, *Laying hens.

Many approaches are being used to find solutions to the problems of waste management. For most poultry operations, waste management problems could be solved by methods of obtaining dry droppings and litter. The dried product could then be used in a variety of ways, such as, recycling the poultry waste. An experiment was designed to test the feasibility of poultry nutrient recycling by refeeding laying hens. Varying proportions of waste material were included in the diets of the hens. Careful records were kepts, and effect on the taste of eggs was tested. The layers fared well on litter and mortality rate was no higher than on regular rations. Also, the taste of the eggs varied insignificantly. Not only was the litter of considerable economic value when recycled, but the return appears to be more than sufficient to bear the expense of drying. (Russell-East Central)
W75-02250

THE USE OF VOLATILE FATTY ACIDS FOR THE CONTROL OF MICROORGANISMS IN PINE SAWDUST LITTER,
North Carolina State Univ., Raleigh. Dept. of Poultry Science.
C. R. Parkhurst, P. B. Hamilton, and G. R. Baughman.
Poultry Science, Vol 53, No 2, p 801-806, March, 1974. 4 tab, 13 ref.

Descriptors: *Microorganisms, *Control, *Litter, Molds, Hydrogen ion concentration, Poultry, Performance, Temperature, Moisture content, Nitrogen, Sampling, *Waste treatment.
Identifiers: *Volatile fatty acids, *Pine sawdust, Acetic acid, Propionic acid.

Pine shavings have been used as a litter for growing broilers, but shavings are becoming scarce and expensive. Pine sawdust is more readily available, but it has a history of increased disease and management problems. The use of volatile fatty acids in the sawdust for the control of microorganisms was investigated. Acetic acid (60%) and propionic acid (40%) were mixed into fresh pine sawdust at 1% and 3% levels. Broilers were placed on the litter when one day old and reared to eight weeks of age. At eight weeks there appreared to be not significant effect on mean body weight, feed conversion efficiency, or mortality. The moisture content, final nitrogen content, and litter temperature were also unaffected by the treatments. Mold growth was retarded slightly at the 3% level for the first two weeks, and bacterial count was retarded for at least a week. The pH was reduced significantly from the control for three weeks at the 3% level and for two weeks at the 1% level. The finding suggest that pine sawdust would serve adequately as a litter material. (Russell-East Central)
W75-02251

SOME CHEMICAL AND PHYSICAL ASPECTS OF PHOSPHATE PRECIPITATION FROM ANAEROBIC LIQUORS DERIVED FROM ANIMAL WASTE TREATMENT LAGOONS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
C. V. Booram, R. J. Smith, and T. E. Hazen.

Paper No 73-4522, presented at 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973. 17 p, 6 fig, 2 tab, 12 ref.

Descriptors: *Chemical precipitation, Physical properties, *Phosphates, *Farm wastes, *Waste water treatment, *Pipe flow, Lagoons, Anaerobic conditions, Irrigation, Waste disposal, Sludge, Equipment.
Identifiers: Minerals.

To be effective, all phases of a waste management system must function efficiently. Recycling anaerobic lagoon liquid to transport manure from swine confinement pens has resulted in magnesium ammonium phosphate buildup in metal pipes. This leaves two alternatives: (1) converting to aerobic systems to oxidize ammonia or (2) developing equipment to overcome the buildup problem. Study indicates that overcoming this problem could best be accomplished by developing equipment. The buildup is a result of the metal interface which exists in the pipes. Therefore, plastic should be used in all plumbing. Some buildup will take place in plastic, but an acetic acid solution should periodically be added to control encrustation. Irrigation equipment used to apply lagoon effluent to land has a small deposition problem but the quantity of once-through flow is low compared to the recycle flow, and will have less of a buildup problem. (Russell-East Central)
W75-02252

NUTRIENT REDUCTION IN WASTEWATER BY GRASS FILTRATION,
Pennsylvania State Univ., University Park. Dept. of Agricultural Engineering.
R. M. Butler, E. A. Myers, J. N. Walter, and J. V. Husted.
Paper No 74-4024 presented at the 1974 Annual Meeting of American Society of Agricultural Engineers, Oklahoma State University, Stillwater, June 23-26, 1974. 12 p, 3 fig, 3 tab, 6 ref.

Descriptors: *Nutrients, *Waste water treatment, *Filtration, *Nitrates, *Nitrogen, *Phosphorus, Municipal wastes.
Identifiers: *Grass filtration.

Effects were studied of flow rate, flow distance, application frequency, and seasonal changes on nitrate and phosphate removal for a grass filtration wastewater renovation system. Renovation was greatest with the lowest application rate and longest flow distance, as expected. Increasing application frequency reduced removal efficiency in both phosphates and nitrates. Laboratory and field studies were undertaken. In the field study no significant reductions in nitrates or phosphates were observed. The laboratory studies indicated that much longer contact time were necessary to obtain adequate nitrate renovation than were employed in the field studies. The laboratory studies also developed a relationship between nitrate concentration, contact time, and temperature that can be used to estimate the detention time required for nitrate removal in grass filtration systems. (Russell-East Central)
W75-02253

SOLIDS-LIQUID SEPARATION: AN IMPORTANT STEP IN THE RECYCLING OF DAIRY COW WASTES,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
A. C. Dale.
Journal of Milk and Food Technology, Vol 36, No 5, p 289-295, 1973. 2 tab, 15 ref.

Descriptors: *Recycling, *Farm wastes, *Cattle, *Dairy industry, Biochemical oxygen demand, Economics, Waste treatment, Waste disposal, Biodegradation, Drying, Equipment, Composting, Methane, Proteins, Oil, *Waste water treatment, *Separation techniques.
Identifiers: *Solids-liquid separation, Refeeding, Land disposal, Building blocks.

For years dairy farmers have looked for a waste management system which would lower labor requirements, make mechanical handling possible, improve automation, lower pollution, and produce something of economic value. Solids-liquid separation may be the answer to the complex and expensive problem of waste disposal. In solids-liquid separation, particles 5 micrometers or larger are removed from the liquid part of the waste. The two fractions left are wet solids and a dilute liquid. The solids contain about 45-80% water. They have little or no odor and may be dried and used for refeeding, mulch, or bedding, thus giving it economic value. The liquid fraction contains about 1-3% suspended solids and about 85-90% of the five-day Biological Oxygen Demand. The liquid can be easily handled by ordinary equipment and can be irrigated directly onto crops and soils. (Russell-East Central)
W75-02273

PERFORMANCE OF FEEDLOT RUNOFF CONTROL SYSTEMS IN MINNESOTA,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
C. L. Larson, L. G. James, P. R. Goodrich, and J. A. Bosch.
Paper No 74-4013 presented at the 1974 Annual Meeting, American Society of Agricultural Engineers, Oklahoma State University, Stillwater, June 23-26, 1974. 17 p, 3 fig, 4 tab, 9 ref.

Descriptors: *Performance, *Feed lots, Runoff, *Minnesota, Waste storage, Waste disposal, Irrigation, Precipitation(Atmospheric), *Mathematical models, Slopes, Climatic data, *Farm wastes, Livestock.
Identifiers: *Runoff control systems, Holding ponds, Land disposal, Formula.

Feedlots located on sites with a considerable slope are potential sources of polluted runoff. Runoff is generally controlled by using a holding pond with land disposal of the stored water. A mathematical model was constructed to determine factors influencing runoff control. Results indicate that in Minnesota, holding pond outflow is caused by a series of rainstorms occurring within a period of five to ten days. Disposal of stored runoff is seldom possible during these times. If the holding pond is designed on the one-day rainfall and runoff data, it should be increased by factor C to obtain an overflow frequency. However, if the holding pond is made larger than necessary, the amount of land disposal can be reduced. For efficient operation of a runoff control system, the holding pond capacity should be equal to the sum of three components: the design runoff, the minimum pumpout, and the residual storage. (Russel-East Central)
W75-02274

THE PLUS AND MINUS OF CONFINEMENT.
Feedlot Management, Vol 15, No 13, p 25-27, 30, 32, 46, December, 1973. 5 fig.

Descriptors: *Confinement pens, *Cattle, *Feed lots, *Farm wastes, *Waste treatment, Waste disposal, Fertilizers, Performance.
Identifiers: Confinement buildings, Land spreading, Holding tank, Slotted floors, Open feed lots.

Confinement feeding is currently one of the major methods of maintaining an efficient feedlot operation. One confinement feeder is Ray Lawson of Maple Park, Illinois. His cold-air confinement building has served for two years and promises to enhance the operation for years to come. The cost of a confinement feedlot operation is about $110 per animal unit. The waste system consists of a holding tank beneath the slotted floor in the confinement facility. The wastes are then spread on land and the value of the fertilizer is estimated at about $35 per acre. Trials conducted on an uninsulated confinement facility and an open lot feedlot have indicated that the performance of feedlot cattle in an uninsulated confinement building is inferior to that of cattle fed in open lots with access to overhead shelter. However, construction of a confinement building can be justified because there is elimination of bedding costs, pollution control, mechanization, the substitution of capital for labor, less land area required, cleanliness of cattle, better control over flies, and the possibility of fewer health problems in a confinement operation as compared to an open feedlot. (Russell-East Central)
W75-02299

WASTE HANDLING AND DISPOSAL GUIDELINES FOR INDIANA BEEF PRODUCERS.
Cooperative Extension Service Report ID-84, Purdue University, Lafayette, Indiana, 1972. 13 p, 3 fig, 3 tab.

Descriptors: *Waste disposal, *Cattle, *Farm wastes, Odor, Solid wastes, Liquid wastes, *Indiana, Regulation, Water pollution, Air pollution, Design, Feed lots, Pastures, Confinement pens, Waste storage, *Waste treatment.
Identifiers: *Waste handling guidelines, Waste disposal systems, Beef producers, Land spreading, Nuisances.

Indiana's confined feeding control law and pollution laws and regulations affecting beef operations are discussed. The pasture, feedlot, and total confinement systems are presented with tips on design and management of beef housing systems. Types of beef waste handling and storage facilities such as solid manure, liquid manure, and partial treatment manure handling systems are also discussed. Finally, guidelines for disposal of beef cattle waste products are presented. Tips are provided concerning land application rates and odor control during disposal. It is hoped that these guidelines will aid beef producers in designing and operating an efficient and pollution free waste disposal system. (Russell-East Central)
W75-02300

TURKEY ANAPHAGE,
Michigan State Univ., East Lansing. Dept. of Animal Husbandry.
H. C. Zindel.
Poultry Digest, Vol 33, No 384, p 73-76. February 1974. 1 fig, 3 tab.

Descriptors: *Recycling, *Waste treatment, Chemical analysis, Performance, Phosphorus, Protein, Nitrogen, Bacteria, Calcium, Sawdust, *Farm wastes, Dehydration, Drying.
Identifiers: *Turkey anaphage, *Poultry anaphage, Dried poultry waste, Poultry litter.

Turkey anaphage is defined as a product composed of turkey excreta that has been dehydrated to reach a moisture content of 10% or less. The dehydration is also designed to destroy any pathogenic bacteria. Poultry anaphage was fed at levels of 0, 5, 10, and 30% of the ration to commercial grade large white turkeys, from 9 to 17 weeks of age. The poultry anaphage was as follows: calcium, 6.3%; phosphorus, 2.6%; crude fiber, 15.6%; ether extract, 3.4%; moisture, 6.7%; crude protein, 19.5%; nonprotein nitrogen, 1.5%; true protein, 10.3%. Body weight gain for the 9 to 17 week age period was not significantly affected by feeding poultry anaphage to these growing turkeys. Research has also indicated that dried layer hen manure has a practical application as litter for brooding and rearing turkeys, but it was hard to manage and had an offensive odor. Turkeys reared on dried poultry waste (DPW) were heavier, and had fewer condemnations and fewer breast blisters. (Russell-East Central)
W75-02301

METHANE RECOVERY FROM CHICKEN MANURE DIGESTION,
Drexel Univ., Philadelphia, Pa.
C. W. Savery, and D. C. Cruzan.
Journal Water Pollution Control Federation, Vol 44, No 12, p 2349-2354, December, 1972. 2 fig, 9 ref.

Descriptors: *Methane, *Poultry, *Farm wastes, *Digestion, *Waste treatment, *Waste disposal, *Recycling, Anaerobic conditions, Aerobic conditions, Drying, Incineration, Thermophilic bacteria, Energy, *Methane, *Anaerobic digestion, Gases.
Identifiers: Total energy system.

To provide preliminary design data for a farm total energy system fueled by methane produced by bacteria, an experimental anaerobic digester was built and daily gas production rates and compositions were determined for loadings of fresh chicken manure. Fresh chicken manure was digested in an experimental 35-1 capacity anaerobic digester. Batch reactor operation in the thermophilic bacteria range at 51C produced 130 l of gas (69 percent methane)/kg of wet manure reacted. Attempts to operate the anaerobic digester at 51C in a continuous flow, well-stirred mode with hydraulic retention times of 4, 5, and 6.7 days resulted in retarded digester operation. Anaerobic processing in conjunction with aerobic digestion, drying, or incineration offers promise of economic waste treatment of chicken manure, particularly if incorporated with a farm total energy system fueled with the recovered methane. (Cartmell-East Central)
W75-02303

MANURE POWER - AN OVERLOOKED ENERGY SOURCE,
D. A. Harter.
Pennsylvania Township News, p 28-30, October, 1973. 3 fig.

Descriptors: *Energy, *Farm wastes, *Methane, *Waste treatment, *Waste disposal, *Recycling, Cattle, Poultry, Water, Sewage bacteria, Organic wastes, *Pennsylvania, Vermont.
Identifiers: *Anaerobic digestor, Ignitable gas, India, South Africa.

The Environmental Improvement Committee for Pennsylvania Agricultural Progress Days (held August 28-30 1973 in Hershey) built an experimental, anaerobic digestor to demonstrate the process of converting animal manure to methane gas. They started with 30-, 40-, and 50-gallon steel drums, some angle irons, a few gas pipe fixtures, a gas light element, an electric heating element, some chicken manure, and began to assemble a generator. After research and experimentation, they found that the gas produced by their slurry was about 72% methane, 18% carbon dioxide, and 10% other gases. A log record indicated an average daily production of about 2.5 cubic feet of gas throughout the six-week period needed for complete digestion of the organic wastes. Experimental data showed 10 cubic feet of methane could be generated from two to three pounds of dry animal waste. (Ballard-East Central)
W75-02304

POWER REQUIREMENTS OF A COMPOST CHANNEL FOR ANIMAL WASTES,
Maryland Univ., College Park. Dept. of Agricultural Engineering.
J. W. Hummel, W. F. Schwiesow, and G. B. Willson.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 17, No 1, p 70-73, January-February, 1974. 3 fig, 3 tab, 6 ref.

Descriptors: *Farm wastes, *Waste treatment, Anaerobic bacteria, Aerobic bacteria.
Identifiers: *Composting, Mechanical agitation.

Composting of waste materials has been done for many years with small amounts of waste being processed at slow rates under anaerobic conditions. But research has determined that when sufficient oxygen is available, decomposition is accomplished faster and with no offensive odor when aerobic bacteria influence the process. Interest in finding a proper mechanical aerobic compostor stimulated this experiment. The experimental channel was constructed out of plywood 37 ft. long and elevated 3 ft. An elevating mechanism was designed to agitate, mix and transport the composting mass the length of the channel. This channel appears to be a promising system for composting agricultural wastes. Actual power measurement data indicated that the carriage used is even heavier than necessary. The artificial test material used was adequate in establishing the effects of design changes on the power requirements of the system, but actual waste material or test materials more closely resembling waste materials are necessary to determine actual power levels. (Russell-East Central)
W75-02305

MANURE, HOW IT WORKS,
Texas Tech Univ., Lubbock. Dept. of Civil Engineering.
D. M. Wells, G. A. Whetstone, and R. M. Sweazy.
Presented at the American National Cattlemen's Association--Environmental Protection Agency, Action Conference, Denver, Colorado, August 28-29, 1973. 18 p, 2 tab, 14 ref.

Descriptors: *Farm wastes, *Waste treatment, *Waste disposal, Recycling, Odor, Economics, Feed lots, Cattle, Fertilizers, Chemical properties, Physical properties, Fuels, Methane, Oil, Gases.
Identifiers: *Waste utilization, Refeeding, Gas synthesis, Composition, Land disposal.

The large quantities of manure being produced by modern feedlots are either a huge problem or a huge potential resource. Manure can be used beneficially in a number of ways, but it has a negative value in virtually all the methods of utilization currently in widespread use. Manure is composed of a variety of compounds, and the sum product of the breakdown of these compounds is usually an odorous process. However, research is being conducted to find ways to control and decrease the negative qualities of manure. One of the most promising projects currently underway is the synthesis gas project. Other valuable projects are experimenting with direct refeeding of wastes. Other techniques have been devised for disposing of manure cheaply, and these processes will probably gain more attention until more sophisticated systems come into widespread use. (Russell-East Central)
W75-02306

MANURE GOOD 'PINCH HITTER' FOR COMMERCIAL FERTILIZER.
Feedlot Management, Vol 16, No 4, p 26, April, 1974.

Descriptors: *Fertilizers, *Phosphorus, *Potassium, *Nitrogen, *Saline soils, *Farm wastes, *Waste disposal, Livestock, Feed lots, *Waste treatment.
Identifiers: Land application, Loading rates.

Because of rising fertilizer costs, interest is being generated for using manure from livestock feeding operations as a plant nutrient source. Tests conducted using manure as a fertilizer source showed that 10 to 15 tons per acre is enough for most crops and anything over 20 tons would not be beneficial. The main drawbacks of using manure as fertilizer are the high costs of hauling and applying the waste, the possibility of introducing noxious plants to uncontaminated fields, and the buildup of salt and of phosphorus in the soil. Long term effects are hard to evaluate, but at present with moderate application rates no problems are foreseen. Above all, research has indicated that with proper application and management of wastes, excellent crop growth can be achieved. (Russell-East Central)
W75-02307

A MATHEMATICAL SIMULATION OF ENVIRONMENTAL CONTROL IN SWINE BUILDINGS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
L. D. Good.
M.S. Thesis, Purdue University, Lafayette, Indiana. Department of Agricultural Engineering, 1971. 58 p, 2 fig, 9 tab, 15 ref, 5 append.

Descriptors: *Environmental control, *Swine, Buildings, *Mathematical models, Mathematical studies, *Confinement pens, Computer models, Temperature, Humidity, Heat, Ventilation, Weather, Input-output analysis, *Simulation analysis, *Computer programs.
Identifiers: Experimental data.

The objective was the development of a mathematical model and computer programs to facilitate the simulation of the environment in confined swine buildings. An additional objective was the design of input and output forms and formats to make the model accessible to interested persons. On the basis of outside temperature and relative humidity, the building, ventilation control and habitation, the mathematical model which has been developed will predict the inside temperature, relative humidity, the occurrence of condensation on the walls, weight gained by the livestock and the amount of energy utilized for ventilation and heating. Input and output forms were designed to facilitate the use of this model by persons not necessarily familiar with or having access to computer facilities. The input forms allow the model to be flexible while the output attempts to present the results in a simple concise form for use by non-technical people. (Cartmell-East Central)
W75-02308

DESIGNING GUTTER FLUSHING SYSTEMS FOR SWINE,
Missouri Univ., Columbia. Dept. of Agricultural Engineering.
R. M. George, and C. E. Browning.
Paper No 73.4519 presented at the 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973. 11 p, 2 fig, 5 tab, 3 ref.

Descriptors: *Design, *Hogs, *Farm wastes, *Waste water treatment, *Waste disposal, Lagoons, Effluent, Flow, Width, Depth.
Identifiers: *Gutter flushing systems, Slope.

Procedures are given for designing open gutter and under slat gutter systems for swine. Gutters should be one half as wide at the exit as they are at the origin and should be wide enough to induce hogs to utilize them. Amounts of water needed vary with depth of manure; width, depth, length, and roughness of the gutter; and the velocity of the water needed to flush the system. (Lee-East Central)
W75-02310

DEHYDRATION OF ANIMAL WASTES FROM LIVESTOCK MARKETS,
Agricultural Research Service, Peoria, Ill. North Central Region.
H. F. Mayes, and T. F. Webb.
Agricultural Research Service Report ARS-NC-9, December, 1973. 6 p, 3 fig, 1 tab, 4 ref.

Descriptors: *Dehydration, *Farm wastes, *Waste water treatment, *Recycling, *Livestock, *Odor, *Dusts, Waste disposal, Moisture content, Drying, Fertilizers, Costs.

Dehydration is a usable method of disposing of large quantities of cattle manure and bedding on livestock markets. The four plants covered in this study used converted alfalfa dehydrators as rotary dryers. All of the rotary drums contained internal flighting, which was an integral part of the outer wall of the drum. Materials processed through dehydrators consisted of cattle manure and bedding. The heat for drying was supplied by natural gas which was burned either in one large nozzle or from several small nozzles. All of the dehydrators studied had a relatively large electrical power demand. Moisture content of raw material taken from the conveyor ranged from 38.7 to 64.5 percent. Extremely important is the moisture content of the dried material leaving the rotary drum, and it is difficult to control. Operating problems are discussed in detail. The operating costs of a dehydrating plant consist of labor, fuel, electricity, repairs, and miscellaneous costs. The total operating cost for producing a pound of dried product ranged from 1.6 to 2.2 cents. Dehydrating plants sell the dried product as a specialty fertilizer. (Cartmell-East Central)
W75-02312

CONTROL OF LARVAE OF THE HOUSEFLY AND THE HORN FLY IN MANURE OF INSECTICIDE-FED CATTLE,
Agricultural Research Service, Kerrville, Tex. Entomology Research Div.
R. O. Drummond, T. M. Whetstone, and S. E. Ernst.
Journal of Economic Entomology, Vol 60, No 5, p 1306-1308, October, 1967. 2 tab, 13 ref.

Descriptors: *Farm wastes, *Insecticides, *Cattle, *Control, *Larvae, Sampling, *Waste treatment.
Identifiers: *Flies.

Short term feeding experiments were conducted to see if certain insecticides fed to cattle could be effective in controlling the common house fly Musica Domestica L. and the horn fly Hematobia irritans L. Fly larva was implanted in the manure of insecticide-fed cattle, and the number of adults that emerged were calculated in determining the effects of the treatments. Mg per kg per day of insecticide effective against house fly larvae were: 5.0 of Bay 37342, 10.0 of bromophos and SD-8447. Mg per kg per day of insecticide effective against horn fly larvae were: 0.5 of Bay 37341, 1.0 of Bay 37340, 10.0 of bromophos, 2.5-5.0 of famphur, 0.5-1.0 of fenthion, 1.5 of Imidan, 10.0 of Shell SD-8447, and 2.5 of Stauffer R-3828. Perhaps in the future insecticides can be combined with a polymer to prevent them from being absorbed in the gastrointestional tract and feed incorporation of insecticides can become a common method of fly control. (Russell-East Central)
W75-02313

USING POULTRY LITTER, IRRIGATION, AND TALL FESCUE FOR NO-TILL CORN PRODUCTION,
Agricultural Research Service, Athens, Ga.
J. R. Carreker, S. R. Wilkinson, J. E. Box, Jr., R. N. Dawson, and E. R. Beaty.
Journal of Environmental Quality, Vol 2, No 4, p 497-500, October-December, 1973. 10 fig, 6 tab, 14 ref.

Descriptors: *Poultry, *Litter, *Irrigation, *Fescues, Crops, Fertilizers, Nitrogen, Phosphorus, Potassium, Lime, Productivity, *Farm wastes, *Waste disposal, Erosion control, Agricultural runoff, Corn(Field), Recycling, *Waste treatment.
Identifiers: No-till corn, Southern Piedmont, Killed sod, Atrazine, Paraquat, Pollution.

This study was undertaken because of the need for cropping system in the Piedmont area which would increase the production of forage and grain, control erosion, and utilize the available nutrients in poultry litter. The objective was to determine the response of irrigated no-till corn, Zea Mays (L), to applications of poultry litter in tall fescue (Festuca arundinacea Schreb.). Corn was planted and irrigated in live soil in soil that was killed with 2.2 and 0.28 kg/ha atrazine and paraquat, respectively. Poultry litter was then added to soil plots at different rates. Nitrogen, phosphorus, potassium, and lime were added uniformly to all soils. Corn yields were higher in killed sod than in live sod. The overall increase was 80%. This method gave excellent runoff and erosion control and produced needed grain while utilizing a waste product with minimum environmental hazards and with small amounts of litter application. (Russell-East Central)
W75-02317

SOLID STATE CONTROLS FOR ENVIRONMENTAL CHAMBERS,
Arkansas Univ., Fayetteville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-02318

EVERYTHING IS ON SLATS,
L. Elam.
Hoard's Dairyman, Vol 117, No 12, p 745, June 25, 1972. 3 fig.

Descriptors: *Farm wastes, *Dairy industry, *Feed lots, *Waste disposal, Irrigation, *Waste treatment.
Identifiers: Slats, *Slatted floors.

Charles Ochsner, of Sumner, Washington, has utilized an easy and inexpensive system of manure handling on his dairy through the use of slatted floors. This system reduced labor costs for one man and virtually eliminated flies. The milking parlor, calf barn, feeding barn and free stall barn are arranged in a square with a 95,000-gallon concrete liquid manure tank in the center of the open square area, framed by the buildings. The free stall barn and feeding barn have slatted floors directly over pits in which sufficient water is kept to make the manure into solution. Each pit has sliding gates which when lifted allow the material to flow to the main pit by gravity. The gates are then closed and necessary water is put into the pit. The corral area over the main pit is concrete floored. There is also a large concrete watering trough, and an agitator and pumping system over the center of the pit. Gratings which can be lifted out for inspection are located over drainways leading to the main pit so manure can be scraped in. It takes about a half hour daily to clean the corral with a shovel. The corral and slats are never washed down. Water and manure from the holding corral and milking barn flow into the pit through pipes. The liquid manure in the large pits is pumped through 4 inch lines to 115 acres of pasture and is spread by a large sprinkler. The pump, which is also used for agitation, is powered by a 70 horsepower diesel engine. (Lee-East Central)
W75-02319

OPERATIONAL CHARACTERISTICS OF MEAT ANIMALS, PART II-BEEF,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
N. C. Teter, J. A. DeShazer, and T. L. Thompson.
Paper No 72-447, presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972. 14 p, 5 fig, 3 tab, 8 ref.

Descriptors: *Metabolism, *Performance, *Mathematical models, Temperature, Feeds, Mud, Energy loss, Environment, Operations, Farm wastes, *Waste treatment.
Identifiers: *Beef, Energy intake.

Basic data published on the energetics of beef animals combined with the basic theory of metabolic changes in beef animals were used to develop a model to predict characteristics and production of growing beef as a function of effective temperature, feed, and mud conditions. In cold weather much of the animal's energy is used to maintain body heat so more feed is required per pound of gain. The heat value of the feed, calculated in BTU's, determines how much feed will be needed for each pound of gain. Mud conditions are important, for to move in mud, an animal must expend high amounts of energy that could otherwise be converted into meat. (Lee-East Central)
W75-02320

BEEF CATTLE FEEDLOT RUNOFF--PHYSICAL PROPERTIES,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 5B.
W75-02321

ANOTHER RECYCLING VENTURE.
Calif News, Vol 11, No 4, p 15-16, April, 1973. 2 fig.

Descriptors: *Recycling, *Fermentation, *Anaerobic conditions, *Farm wastes, Amino acids, Feeds, Fuels, Cattle, Feed lots, Gases, Methane, Carbon dioxide, Costs, *Waste treatment, Waste disposal.
Identifiers: Thermophilic range.

Hamilton Standard of Windsor Locks, Connecticut initiated an experiment in December 1970 to determine the feasibility of converting animal wastes into usable by-products by anaerobic fermentation. At the time of this report, two twenty-liter fermenters had been used for 1 1/2 years. The operating temperature was in the thermophilic range and the feed material was animal waste obtained from cattle fed a high concentrate ration. Tank volumes of only 1/3 that of municipal systems were deemed practical. The system utilized very thick waste concentrations, operated with high process loading rates and small fermenter volumes, had low power requirements and generated its own fuel. Advantages of the process were: (1) It produces two products (fuel and animal feed ingredient) which could be used in the feedlot operation. (2) It would accept all of the solid wastes in the form available. (3) It had no discharges of liquid, solid, or gaseous pollutants. This study showed the anaerobic process to require two-thirds the capital investment and one-half the annual operating expense compared to the aerobic process. (Lee-East Central)
W75-02322

COMPOSTED MANURE CALLED 'AVAILABLE FUEL SOURCE'.
Feedlot Management, Vol 16, No 4, p 28, 30, April 1974. 1 fig.

Descriptors: *Farm wastes, *Fuels, *Recycling, *Waste treatment, *Waste disposal, Aerobic bacteria, Thermophilic bacteria, Sulfur, Organic wastes, Pathogenic bacteria, Moisture content, Odor, Energy.
Identifiers: *Compost, Pyrolysis.

A method of converting the nation's animal wastes into usable sulfur-free fuels through a rapid composting process has been proposed as a way to ease the energy crisis. Three billion tons of organic wastes are produced each year. If all these were available, they could be converted to 1/4 of our natural gas requirements. Manure doesn't lend itself to easy burning unless it is composted because of high moisture content. The action of thermophilic, aerobic bacteria produces heat high enough to drive off the moisture and kill pathogenic bacteria. The resulting product is safe, stable and easy to store. 15 to 28 BTU's are created for each BTU expended and the composted fuel can be added to other fuels to create higher energy levels. (Lee-East Central)
W75-02323

PROCEEDINGS: BIG ISLAND SWINE CONFERENCE, CURRENT AND FUTURE TRENDS IN SWINE WASTE MANAGEMENT.
Conference held September 11, 1971. University of Hawaii Cooperative Extension Service Miscellaneous Publication 82 (1971). 29 p.

Descriptors: *Hogs, *Farm wastes, *Hawaii, *Waste treatment, *Waste storage, *Waste disposal, Confinement pens, Production.
Identifiers: Pork industry, Waste management.

This conference was held with the purpose of discussing pork producers' problems and solutions. Planning, budgeting, production, pollution, ecology, waste treatment, waste disposal, and zoning were major topics discussed. It was hoped that the conference would be a major step forward in pushing standards for quality, price stabilization, and technological improvement in Hawaii. (See also W75-02332) (Merryman-East Central)
W75-02324

FEDERAL PRODUCER ASSISTANCE PROGRAMS,
A. Bennett.
In: Proceedings: Big Island Swine Conference, Current and Future Trends in Swine Waste Management, September 11, 1971, Miscellaneous Publication 82, Cooperative Extension Service, University of Hawaii, p 5, (1971).

Descriptors: *Farm wastes, *Waste treatment, *Cost sharing, Aerobic conditions, Anaerobic conditions, Lagoons, Waste storage, Odor, Diversion structures, Hawaii.
Identifiers: Federal Producer Assistance.

To assist producers in installing adequate treatment facilities for animal wastes, the Agricultural Stabilization and Conservation Service provides payments in the form of federal cost-share for installation of waste disposal systems. These systems are usually one of three types: lagoons, storage facilities, or diversions. Lagoons treat wastes in such a way that the waste can be discharged either directly to a waste course or on land. There are two types of lagoons-aerobic, which requires a large land area, and anaerobic, which requires little land area but produces on offensive odor. Storage facilities are used temporarily until waste is removed and spread on land for fertilizer as needed. Diversions are used to divert excess runoff from feedlots or waste disposal areas to treatment locations. In Hawaii, lagoons should be adequate to fill the needs for waste treatment because they can function year round; on the mainland temperature variations allow them to function only eight to nine months of the year. (See also W75-02324) (Russell-East Central)
W75-02325

HOG PRODUCTION ZONING REQUIREMENTS,
P. Yoshimura. /
In: Proceedings: Big Island Swine Conference, Current and Future Trends in Swine Waste Management, September 11, 1971, Miscellaneous Publication 82, Cooperative Extension Service, University of Hawaii, p 8-9, (1971).

Descriptors: *Hogs, *Zoning, *Hawaii.
Identifiers: Non-conforming piggery, Residential agricultural zones, Unplanned zone, Agricultural zones, Property line.

By Hawaiian state law a piggery is any premise on which five or more weaned hogs are maintained. The maintenance of hogs is regulated by zoning requirements; pigs may be allowed in three zones: The RA zone, A zone, and U zone. The RA or Residential Agricultural zone applies to a low density surburban area with a minimum allowable lot of one-half acre. Pigs are subject to the Department of Health and any building or enclosure for pigs must be kept at least sixty feet from any property line. The A or Agriculture zone applies to an agricultural area with allowable lots sized from 1-40 acres. Piggeries must be 1,000 feet or more from any major public road and accessory buildings shall be at least 100 feet from the front property line. The U or Unplanned zone applies to areas not subject to sufficient studies to adopt specific zones. Lot sizes are a minimum of five acres. Pens cannot be closer than 100 feet from any property line or 50 feet from any residence, and they must be on sites approved by the Board of Health. Variances from these regulations can be granted by the Planning Commission. Also piggeries in existence before zoning may remain as long as the are not enlarged. (See also W75-02324) (Russell-East Central)
W75-02327

SWINE WASTE DISPOSAL AND CONTROL,
Hawaii Univ., Honolulu. Dept. of Animal Science.
W. Hugh.
In: Proceedings: Big Island Swine Conference, Current and Future Trends in Swine Waste Management, September 11, 1971, Miscellaneous Publication 82, Cooperative Extension Service, University of Hawaii, p 10-11, (1971). 4 ref.

Descriptors: *Hogs, *Waste disposal, *Control, *Confinement pens, *Farm wastes, Aerobic conditions, Anaerobic conditions, Recycling, Livestock, Pollutants, *Hawaii.
Identifiers: Composting, Land spreading.

The Hawaii Department of Health studied 179 hog operations and found that 94 posed a problem to neighbors due to animal wastes. It is estimated that fifty percent of wastes were from confinement areas, and this poses a particular problem in Hawaii because of scarcity of land. The study found that pollution from animal manures arises because of: organic substances, inorganic substances, odors, infectious agents, and insects. Waste management systems usually incorporate land spreading, biological treatment, composting, or recycling as feed. Land spreading is the major method employed, but it requires a large land area. Biological treatment by means of lagooning is more feasible in Hawaii, and there are two types--aerobic and anaerobic. Anaerobic lagoons produce odors but do not require as much land area as the non-odorous aerobic lagoons. Composting or drying is also effective in that it reduces volume and weight by fifty percent. Recycling as feed could become an effective means of waste utilization, but the Food and Drug Administration looks unfavorably on this method. However, experimental work has incorporated as much as fifty-seven percent manure into cattle rations. (See also W75-02324) (Russell-East Central)
W75-02328

SWINE HOUSING AND WASTE DISPOSAL DESIGNS,
D. Nelson.
In: Proceedings: Big Island Swine Conference, Current and Future Trends in Swine Waste Management, September 11, 1971, Miscellaneous Publication 82, Cooperative Extension Service, University of Hawaii, p 13-23, (1971). 5 fig, 7 tab.

Descriptors: *Hogs, *Farm wastes, *Waste disposal, *Design, *Lagoons, *Oxidation lagoons, Aerobic conditions, Anaerobic conditions, Biological treatment, Liquid wastes, Surface runoff, *Hawaii, Waste treatment.
Identifiers: Slatted floors.

The system chosen for proper waste disposal is very important. It should be adequately designed to handle current and future wastes, and it should comply with all laws. To develop a lagoon system, the floors should be slotted so they can be flushed with water. There should be a gutter beneath the floors which could either store the wastes or carry them to a lagoon or oxidation ditch. The lagoon is either a deep ditch called an anerobic lagoon or a shallow one called an aerobic lagoon. The liquid level of both should be maintained and excess should be spread on land. In oxidation ditches, decomposition is accomplished by aerobic bacteria. These bacteria decompose with virtually no odor. Oxidation ditches can als o be used in conjunction with other disposal methods such as lagoons. A problem with lagoons and oxidation ditches is runoff of rainfall. However this can usually be controlled by choice of locations. (See also W75-02324) (Russell-East Central)
W75-02329

HAWAII, ISLAND OF HOPE FOR PORK INDUSTRY,
Hawaii State Dept. of Agriculture, Honolulu.
F. Erskine.
In: Proceedings: Big Island Swine Conference, Current and Future Trends in Swine Waste Management, September 11, 1971, Miscellaneous Publication 82, Cooperative Extension Service, University of Hawaii, p 25-27, (1971).

Descriptors: *Hawaii, Hogs, Automation, *Farm wastes, *Waste treatment.
Identifiers: *Pork industry, Swill collection, Super farm, Agri-business, Tilapia production.

The high cost of land in Hawaii has caused the high cost of pork production. This high cost of land doesn't allow the Hawaiian pork producers to compete with the mainland. The ideal way to compete with other pork producers is to have a massive agricultural complex for production of beef, pork, feed, etc., and to have a large combined waste disposal system to eliminate pollution. This super farm could someday be a reality; but, for the present, pork producers must organize to improve the pork industry by finding capital, planning and developing for the industry's future, establishing more efficient programs such as swill collection and processing, establishing standards of quality and price stabilization, developing and supporting marketing programs, pushing technological research, and improving the aesthetics of the hog farm through landscaping and odor reduction. (See also W75-02324) (Russell-East Central)
W75-02330

CURRENT PROBLEMS FACING THE PORK PRODUCERS--SOME OBSERVATIONS,
S. Roehrig.
In: Proceedings: Big Island Swine Conference, Current and Future Trends in Swine Waste Management, September 11, 1971, Miscellaneous Publication, 82, Cooperative Extension Service, University of Hawaii, p 28, (1971).

Descriptors: *Hogs, Production, Processing, *Hawaii, *Farm wastes, *Waste treatment.
Identifiers: *Pork industry, Slaughtering.

It appears that Big Island pork producers face a promising future. The chief way to insure this future is to work together and have periodic meetings to consider problems of the industry--problems such as disease, production, ecology, etc. It is also important that price standards and a uniform marketing policy be adopted. Local pork producers should collectively promote consumption of pork in the Islands. Yet, the producers must face the problem of slaughtering. Since there is only one slaughter house on Oahu, the producers themselves should construct and maintain a slaughter house. By doing this, they could have some control over the disposition of the carcasses. With a joint effort of the government and the pork producers, the Hawaiian pork industry should prosper. (See also W75-02324) (Russell-East Central)
W75-02331

SUMMARY AND CONCLUSION,
T. T. Yamamoto.

In: Proceedings: Big Island Swine Conference, Current and Future Trends in Swine Waste Management, September 11, 1971, Miscellaneous Publication 82, Cooperative Extension Service, University of Hawaii, p 29, (1971).

Descriptors: *Hogs, Confinement pens, Pollutants, Ecology, *Hawaii, *Waste treatment.
Identifiers: *Pork production, *Waste management.

The Big Island Swine Conference was a step in the right direction as far as the efficiency of the pork industry of Hawaii is concerned. Pork producers must become more aware of pollution, ecology, and the environment if the industry is to grow and fulfill the state pork needs. There are now sixty sows on three-fourths acre of land as compared with twenty sows on four acres of pasture land before confinement was adopted. This kind of change brings many problems which must be faced. Early planning of a waste disposal system is vital for future expansion and productivity. (See also W75-02324) (Russell-East Central)
W75-02332

SOLID MANURE HANDLING FOR LIVESTOCK HOUSING, FEEDING AND YARD FACILITIES IN WISCONSIN,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.
E. G. Bruns, and J. W. Crowley.
Publication No A2418, Cooperative Extension Programs, University of Wisconsin, Madison, November, 1972. 83 p, 50 fig, 17 tab.

Descriptors: *Solid wastes, *Livestock, Facilities, *Wisconsin, Dairy industry, Legal aspects, Planning, Design, Waste storage, *Farm wastes, Poultry, Equipment, Specifications, *Treatment facilities, *Waste treatment, Waste disposal.
Identifiers: *Waste management, Land spreading, Fly control.

These guidelines for solid manure storage systems are the results of discussions, suggestions and opinions by the Wisconsin Dairy Cattle Housing Committee. As a general rule, manure should be returned to agricultural land. Problems which must be controlled include pollution of surface or ground water, odor, insects, aesthetic offensiveness, and lower milk quality due to contamination by manure. Dairy farmers should obtain approval from their county zoning authority and have a detailed building and management plan before beginning construction of facilities. Also, suggestions and guidelines for constructing waste handling systems are presented. Proper management maintenance and operation of the livestock facility and the manure handling system are essential. The suggestions for construction in these guidelines can meet requirements only if combined with good management. (Russell-East Central)
W75-02333

POULTRY WASTE MANAGEMENT ALTERNATIVES,
North Carolina Agricultural Extension Service, Raleigh.
L. B. Driggers, J. M. Falter, D. G. Harwood, G. J. Kriz, and J. F. Lutz.
North Carolina Agricultural Extension Service, Circular 570, September, 1973. 19 p, 1 fig, 11 tab.

Descriptors: *Poultry, *Farm wastes, *Waste treatment, *Waste storage, *Waste disposal, Recycling, Drying, Economics, Pest control, Water pollution, Soil contamination, Slurries, Lagoons, Effluent, Leaching, Nitrogen, *Alternate planning.
Identifiers: *Waste management, Odor control, Deep pit houses, Composting, Refeeding, Land application, Turkeys.

This bulletin gives waste management alternatives which will help the poultry producers meet problems in the most practical and economical way. Producers or prospective producers who plan to renovate should look at the poultry production unit as a total system and should attempt to: (1) locate in the center of a large land tract if possible; (2) be sure sufficient land is available for waste disposal; (3) not locate the operation in a heavily populated area; (4) not locate the operation near drainage ditches, streams, rivers, and estuaries. Described are alternative waste management systems, utilization and land requirements, odor control, pest control, and economics. Various systems of waste disposal are discussed, examples of how much waste can be applied per acre are given, suggestions are given for reducing odor and pest problems, and estimated cost data are presented. (Russell-East Central)
W75-02334

LIVESTOCK WASTE MANAGEMENT SYSTEMS DESIGN AND OPERATION,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
E. A. Olson.
Paper No 73-4539, presented at 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973. 9 p, 12 fig.

Descriptors: *Farm wastes, *Waste treatment, *Design, *Operation and maintenance, Dikes, Waste disposal, Education.
Identifiers: Waste treatment systems, Debris basin, Holding pond.

Livestock waste management systems based on research are proving effective in controlling livestock waste in Nebraska. An educational program including the livestock industry and state and federal agencies has helped acceptance of waste management. Most waste systems have a method for diversion of runoff from a feedlot; for collection of runoff which is held in a debris basin; and for pumping the basin after the solids settle. No matter what the type of system good management is essential to assure satisfactory operation. Two jobs that need particular attention by the feeder to insure proper waste management are: (1) periodic cleaning of the debris basin, and (2) pumping of the holding pond. (Russell-East Central)
W75-02335

BROILER LITTER SILAGE FOR FATTENING BEEF ANIMALS,
Texas A and M Univ., College Station. Dept. of Poultry Science.
C. R. Creger, F. A. Gardner, and F. M. Farr.
Feedstuffs, Vol 45, p 25, January 15, 1973. 4 tab.

Descriptors: *Waste disposal, *Feeds, *Cattle, Poultry, Recycling, Pathogenic bacteria, Fermentation, *Waste treatment.
Identifiers: *Broiler litter silage, Drugs, Trace minerals, Fattening.

Broiler litter on pine shavings was ensiled at 35-38 percent moisture content in an airtight silo for six weeks then fed with a 12 percent protein mix ad libitum to heifers for 120 days. The calves gained 2.54 lb per head per day. No drug carryover of any consequence occurred. Pathogens were eliminated by the heat of ensilage. A taste panel expressed some preference for steaks from control cattle but found the litter-fed beef highly acceptable. (East Central)
W75-02336

CONTROL OF FLIES AROUND FEEDLOTS,
For primary bibliographic entry see Field 5G.
W75-02337

DIGESTIBILITY OF FEEDLOT WASTE,
R. R. Johnson.
Oklahoma Agricultural Experiment Station, Animal Science Research, p 62-65, 1972. 5 tab.

Descriptors: *Feedlots, *Farm wastes, *Recycling, *Feeds, Cattle, Sheep, Ruminants, Proteins, Organic matter, *Oklahoma, *Waste treatment.
Identifiers: *Digestibility, Dry matter, Nutritive value.

The nutritive value of feedlot wastes as a component of rations for ruminant animals was investigated. Three samples of feedlot wastes were obtained from typical feedlot operations. The first was a sample from the mound of material, the second from feedlot waste from a growing lot and the third from a finishing lot. The feedlot wastes utilized in these experiments were extremely high in ash content varying from 35 to 43.5 percent. The crude protein content varied from 15-19 percent. Digestibility of the dry matter varied from 35 to 50 percent and the organic matter, from 42 to 56 percent. The digestible protein content of the feedlot wastes was quite high. Further analyses are being made on these rations and the feces from the animals in the digestion trial to determine the true digestibility of the energy in the ration. (Cartmell-East Central)
W75-02338

DOUGLAS FIR BARK AS A TRICKLING FILTER MEDIUM FOR ANIMAL WASTE DISPOSAL SYSTEMS,
Oregon State Univ., Corvallis.
M. G. Cropsey, and P. H. Weswig.
Oregon State University Agricultural Experiment Station, Technical Bulletin 124, February, 1973. 11 p, 9 tab, 9 ref.

Descriptors: *Douglas fir trees, *Bark, *Trickling filters, *Farm wastes, *Waste disposal, Biological oxygen demand, Nitrogen, Phosphorus, Turbidity.
Identifiers: *Animal waste disposal systems, Total solids.

Douglas-fir bark, 3/4 inch and 1 1/2 inch in size, was tested in recirculating trickling filters 1, 2, and 3 feet in depth, hydraulically loaded at 2.27, 4.54, and 9.08 gallons per minute per square foot (gpm/sq.ft.) with 2 and 4 percent poultry manure slurry at 70F. Preliminary tests indicated the necessity of allowing the heavier waste particles to settle by gravity. Samples collected at the beginning and at intervals during the run indicated that the reduction of biological oxygen demand (BOD) followed close to the formula BO(D sub t) = BO(D sub o)(10 to the -kt power). Also, as the depth of filter and the rate through the filter increased, the rate of removal of total solids increased. However, the rate of flow through the filter had little effect upon nitrogen removal, as this was influenced by the length of time circulated and the depth of the filter bed. BOD and total solids concentrations lowered at a faster rate when the larger bark was used. There was no indication that the bark increased in either nitrogen or phosphorous during the tests. The turbidity on an average improved from 75 to 4.3 JTU (Jackson turbidity units) for the 2 percent concentrations and from 157 to 16.4 JTU for the 4 percent concentrations in 23 hours. (East Central)
W75-02339

AGRICULTURAL WASTE UTILIZATION VERSUS DISPOSAL,
DeKalb AgResearch, Inc., Ill.
J. W. Claybaugh.
Compost Science, Vol 11, No 6, p 18-19, November-December, 1970. 1 fig.

Descriptors: *Waste disposal, *Farm wastes, *Agriculture, Livestock, Poultry, Drying, Odor, Sludge, Nitrogen, Phosphorus, Moisture, Lagoons, Feeds, Recycling, *Waste treatment, Methane, Research and development.
Identifiers: *Waste utilization.

27The problem of agricultural waste disposal is a four point problem of: bird and animal concentra-

tion; changes in management systems; urban society moving to the source of production; and an awareness of society's right to clean air and water. Most people feel that keeping manure dry is the only method that should be used for maintaining odor control. This may be done by transferring moisture away from the manure particle by air movement and/or heat. If composting would take place within the building, the water from the fresh manure could be utilized for the aerobic bacteria. Handling manure wet, or by the hydraulic method is the easiest and simplest way of getting it out of the house. The problem is the anaerobic or septic odors in the lagoon or on spreading of the sludge on the land. A plastic bubble might be put over the lagoon to collect the methane gas for the operation of the electric generation equipment for the farm. The true value of all the manure produced by laying hens in the United States, based on 8 cents/pount of N, 6 cents P, and 6 cents K, is $40,000,000/year, besides the value of trace elements and humus. Livestock wastes could be pasteurized and processed so they could be a source of feed nutrients. Michigan State has indicated in a preliminary report that it appears that processed poultry nutrients are about equal to corn in value with no residue of either pathogens or chemicals. (East Central)
W75-02340

DPW FOR FEED, SHORTCOMINGS AS FEED INGREDIENT,
Cornell Univ., Ithaca, N.Y. Dept. of Poultry Science.
M. C. Scott.
Egg Industry, Vol 6, No 7, p 36, 38, July 1973. 1 fig, 1 tab, 6 ref.

Descriptors: Feeds, *Proteins, *Farm wastes, *Poultry, Dehydration, Recycling, *Waste treatment, Waste disposal, Performance, Amino acids, Ammonia, Nitrogen, Phosphorus.
Identifiers: *Dried poultry wastes, *Refeeding.

The true value of poultry waste as a protein supplement has long been questioned. Most of the nitrogen in pure poultry manure is not protein at all, but is a product of metabolism such as uric acid, ammonia salts, creatine, creatinine, etc. Nesheim (1972) reports that the actual protein content of poultry manure is only about 10.8% and not 30-35% as previously assumed. Young and Nesheim (1972) have found that the maximum amount of poultry waste that can be fed to poultry without affecting egg production is about 22 percent. This, in turn, would result in extra manure which must be dealt with by other waste management systems. Calculations indicate that the value of the manure is no greater than $26 per ton. Also, when fed back to poultry, the manure is not a good source of protein and is a poor source of energy. (Russell-East Central)
W75-02343

REVERSE OSMOSIS MEMBRANES CAST FROM A CELLULOSE ACETATE-METHANOL-DIOXAN DOPE,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 3A.
W75-02370

BROILER LITTER MANAGEMENT,
Oregon State Univ., Corvallis. Dept. of Poultry Science.
R. W. Dorminey, and P. H. Weswig.
Unpublished paper, (1973), 3 p.

Descriptors: *Poultry, *Litter, Management, Broods, Weather, Chemical analysis, Nitrogen, Oregon, *Waste management.
Identifiers: *Broilers, *Composting, Fir shavings, Commercial additive, Cedar mulch.

Six instructions for composting litter were given and discussed. A series of experiments was conducted with four treatments used: (1) pens cleaned out and new fir shavings added after each brood; (2) one to two inches plus wet spots removed and replaced with new fir shavings; (3) fir shavings used once, then composted after each brood using the commercial additive; and (4) fir shavings used once, then composted after each brood without the commercial additive. A total of eight different broods were grown on composted litter. If the litter is dry and the weather conditions are moderately warm and dry when the litter is composted, the litter will dry sufficiently and broiler performance will equal or exceed that obtained with either new litter or with litter reused without composting. Litter can be composted without a commercial additive with exactly the same effects. Chemical analysis showed higher percentages after the composting for all elements except nitrogen. A material called cedar mulch can be satisfactorily used as a broiler litter and can be composted. (Cartmell-East Central)
W75-02432

CONCRETE AND ALUMINUM SLATTED FLOORS FOR CONFINEMENT BEEF FINISHING,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
J. I. Sewell, and G. D. Miller.
Paper No 73-4540 presented at 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973. 11 p, 2 tab, 7 ref.

Descriptors: Concrete, *Confinement pens, *Cattle, *Farm wastes, Waste storage, *Waste treatment, *Waste disposal, Performance, Costs, Odor, Tennessee.
Identifiers: *Slatted floors, Aluminum, Beef finishing, Gains.

A beef finishing slatted-floor facility was completed in the fall of 1971 at the University of Tennessee Aluminum Company of America Farm. An existing barn with a concrete-slab floor was remodeled to include aluminum slats and reinforced-concrete slats were installed over reinforced-concrete manure collection pits in half the barn (six pens), while the slab was left intact in the other half (four pens). The liquid manure in the pits was agitated, removed from the pits by liquid manure tank-spreaders, and spread on crop or pasture land. Data were collected on facility design, costs, manure accumulation rates, manure removal procedures, stocking density, cattle behavior, and odors. A comparison was also made between labor requirements for manure management on slatted-floor and concrete-slab floor systems. Bulls fed on floors of aluminum slats, concrete slats, and concrete slabs exhibited similar gain performance. After two years, the aluminum slats have been only slightly damaged by electrolysis or the weight of the cattle. Aluminum slats were noticeably cleaner than concrete slats. (Cartmell-East Central)
W75-02433

SOLIDS TRAP FOR BEEF CATTLE FEEDLOT RUNOFF,
Agricultural Research Service, Lincoln, Nebr.
N. P. Swanson, and L. N. Mielki.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 4, p 743-745, July/August, 1973. 2 fig, 2 tab.

Descriptors: *Cattle, *Feed lots, *Agricultural runoff, *Solid wastes, *Waste storage, *Waste treatment, Sediment transport, Physical properties.
Identifiers: *Solids trap.

Solids transported by runoff from cattle feedlots and allowed to deposit in a holding pond in uncontrolled quantities create three serious problems. First, runoff storage capacity is reduced by deposited solids. Second, emptying by pumping is difficult when solids have accumulated. Third, decomposition of the solids produces odors in warm weather. In 1969, a solids trap consisting of a broad, flat channel 14 feet wide and 80 feet long was installed to pass the runoff collected from a sloping 0.85-acre feedlot. The channel was about 2 1/2 feet deep and sloped only 3 or 4 inches toward the discharge end. Mesh galvanized hardware-cloth screens were installed vertically across the channel and placed 35 and 55 feet from the inlet end of the channel. On July 23, 1971, 21 cubic yards of solids were removed from the holding pond. This was the total accumulation of settleable solids from July 3, 1969. In this two-year interval, the trap retained 81 cubic yards of sediments from 12.33 inches of runoff produced by 50.77 inches of precipitation. No problems arose in removing the solids from the trap. Installation of a concrete or crushed rock surface in the channel bottom may be desirable where removal of solids with higher water contents is required. (Drewry-East Central)
W75-02434

BAFFLED CENTER CEILING VENTILATION INLET,
South Dakota State Univ., Brookings. Dept. of Agricultural Engineering.
M. A. Hellickson, H. G. Young, and W. B. Witmer.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 4, p 758-760, July-August, 1973. 6 fig, 13 ref.

Descriptors: *Ventilation, *Temperature, *Intakes, *Baffles, *Cattle, *Air circulation, *Waste treatment.
Identifiers: *Ceiling ventilation, Exhaust fans, Manure pit.

In the summers of 1970 and 1971, studies were made on the ventilation characteristics in the Farmers' Union Grain Terminal Association's 48 by 40 ft. closed confinement beef unit. The original ventilation system employed two thermostatically controlled variable speed exhaust fans and four constant speed exhaust fans. This design allowed summer ventilation air to enter the building through baffled 4 inch continuous inlets along the north and south walls. The inlet system was redesigned prior to use during the summer of 1971. The new design employed at center ceiling inlet for year-round ventilation. Air movement in the closed environment beef unit during 1970 almost exclusively occurred in the upper portion of the building. In 1971, air circulation around the animals was clearly noticeable and ventilation was much better. Average temperature at animal level from June 26 to October 30, 1971, exceeded average outside temperature by 4.4F. In 1970, the average temperature at animal level exceeded average outside temperature by 9.6F. In 1971 tempering of ventilation air in the north half of the attic ranged from 5F above to 2F below and averaged 0.2F above outside temperature from June 26 to October 30. Although solar tempering was greatest during hot weather, ambient temperature exceeded outside temperature more during periods of cooler temperature. (Cameron-East Central)
W75-02435

SOLID WASTE MANAGEMENT ALTERNATIVES,
B. Sullivan.
Feedlot Management, Vol 15, No 5, p 26-30, May, 1973.

Descriptors: *Solid wastes, *Farm wastes, *Feed lots, *Waste storage, *Waste disposal, Economics, Costs, Transportation, Fertilizers, Equipment, Nitrogen, Cattle, *Alternative planning.
Identifiers: *Waste management, Commercial loader, Spreader truck, Rotary scraper, Windrow composting.

Solid manure management involves collection, transportation, storage, processing and disposal--operations that encompass an array of techniques and equipment which can be used in many combinations. The costs of these operations are vital to feedlot owners. Investment and operating costs for manure collection and removal vary with feedlot size, annual days of equipment use, and manure hauling distance. An economic comparison is made of the use of a commercial loader (skip loader) and a spreader truck, a rotary scraper attached to a tractor, and a self-propelled elevating scraper. The pros and cons of waste storage by composting in windrows and of waste disposal on crop lands are also considered. (Cameron-East Central)
W75-02437

THE BUILDING OF A FEEDLOT,
Mower Lumber Co., Eutawville, S.C.
P. W. Schumacher.
Paper No 73-4542, presented at the 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973. 7 p.

Descriptors: *Feed lots, *Farm wastes, *Cattle, *Waste disposal, *Dairy industry, Fermentation, Feeds, Humidity, Recycling, *South Carolina, *Waste treatment.
Identifiers: *Manure-flush system, Refeeding, Silos, Feed efficiency, Shade, Land spreading.

The establishment and maintenance of a feedlot operation on Walworth Farms, Eutawville, South Carolina has shown that cattle feeding can be done successfully in the Southeastern United States. A liquid pipeline system was constructed in which wastes were flushed from sloping concrete pens, carried off by pipeline, and spread over the surrounding sandy cropland. A fermentation feeding method was developed which resulted in 10 to 12 percent improved feed efficiency and 8 to 12 percent weight gain increase. Also discussed are the environmental effects of manure spreading and of refeeding solid wastes separated by the liquid handling method. (Hargrove-East Central)
W75-02438

ENVIRONMENTAL CONTROL,
For primary bibliographic entry see Field 5G.
W75-02553

IN-PLANT USAGE WORKS AND WORKS,
Allied Chemical Corp., Morristown, N.J. Industrial Chemicals Div.
R. W. Ockershausen.
Environmental Science and Technology, Vol 8, No 5, p 420-432, May 1974. 5 fig.

Descriptors: Waste water treatment, *Nutrients, *Phosphorus, *Suspended solids, *Biochemical oxygen demand, Sewage treatment, Trickling filters, Activated sludge, Tertiary treatment, Capital costs, Operating costs, Treatment facilities, Primary treatment, Microorganisms.
Identifiers: Treatment plants.

The report discusses the study of waste water nutrients and the methods of upgrading treatment plant effluents which have resulted as consequence of Federal water pollution control legislation. It has been found that chemical storage tanks and feeders can be rapidly and economically installed in existing plants in the process of modernizing and increasing the capacity of waste water treatment plants. Certain concentrations of carbon, nitrogen, phosphorus, potassium, silicon, and other elements are essential in the support of microorganisms, fish, and other marine life; yet, an overabundance of these nutrients results in excessive algae growths and degradation of the water begins as the microorganisms die. The reduction of phosphorus, suspended solids, and the biochemical oxygen demand is discussed with respect to primary waste water treatment, a trickling filter plant process, activated sludge treatment, and physical-chemical treatment. Also discussed are the capital and operating costs involved in upgrading waste water treatment. (Sandoski-FIRL)
W75-02558

THE MOVEMENT OF EFFLUENT FROM THE CITY OF MIAMI SEWAGE OCEAN OUTFALL,
Miami Univ., Fla. Sea Grant Institutional Program.
For primary bibliographic entry see Field 5E.
W75-02559

OPEN DAY CONDUCTED BY CONTROL EQUIPMENT COMPANY.
Australian Chemical Engineering, Vol 14, No 12, p 25-28, December 1973.

Descriptors: *Industrial plants, *Control systems, *Effluents, *Waste water treatment, Instrumentation, Automation, Ions, Analytical techniques, Industrial water, Industrial wastes, Mineral industry.
Identifiers: *Polymetron Method, Australia, Treatment plants.

The Zellweger company in Australia conducted an open day discussion meeting with industrial representatives at its facilities which specialize in control equipment. The Polymetron modular instrument system was highlighted as a new method of automating effluent treatment plants. The development of the Polymetron Sensotrode makes ion determination a simpler, faster operation replacing highly complex chemical determinations. Outlined is the procedure for effluent water treatment in the metal industry by the polymetron method. (Sandoski-FIRL)
W75-02560

TECHNOLOGY AND ENVIRONMENTAL CONCERNS.
Department of Energy, Mines and Resources, Ottawa (Ontario).
For primary bibliographic entry see Field 5B.
W75-02561

NEW CONCEPTS FOR DAIRY WASTE MANAGEMENT,
California Univ., Los Angeles. School of Public Health.
C. L. Senn.
Journal of Milk and Food Technology, Vol 35, No 12, p 703-707, December, 1972. 3 fig.

Descriptors: *Dairy industry, *Farm wastes, *Waste treatment, *Waste disposal, *Waste storage, *Recycling, Water pollution, Air pollution, Feed lots, Waste water treatment, California, *Aeration, *Aerobic treatment.
Identifiers: *Waste management, *Composting, Aeration, Earth corrals, All-paved corrals, Environmental housing, Dairy wastes.

The study included covered all-paved corrals--both water-flushed and mechanically cleaned. A simple aeration process produced compost at low cost. The product was 'pasteurized,' weed-seed free, and an attractive soil amendment. Aerobic composting, with 'environmental housing' and with aerobic treatment of liquid dairy farm wastes, gives promise of providing relatively nuisance-free and pollution-free, high density housing for approximately 200 cows per acre. (Drewry-East Central)
W75-02573

CHEMICAL COMPONENTS AND ESTIMATED DIGESTIBILITY OF DEHYDRATED CATTLE MANURE,
Bureau of Reclamation, Grand Junction, Colo.
For primary bibliographic entry see Field 5B.
W75-02574

DEVICE AND APPARATUS FOR TREATING LIQUIDS SUCH AS DRINKING WATER AND WASTE WATER,
P. Chappal.
United States Patent 3,823,923. Applied January 11, 1972. Issued July 16, 1974. Official Gazette of the United States Patent Office, Vol 924, No 3, p 569, July, 1974. 1 fig.

Descriptors: *Patents, *Tanks, *Pumps, Equipment, Potable water, Waste water treatment, Liquids, Gases, Europe.
Identifiers: France.

A device was patented which is comprised of a tube, immersed in the liquid of a tank. This communicates at its upper end with treating gas-supply means. A diffuser with radial vanes fixed to a rotating disc is connected with the lower end of the tube. A pump disposed under and coaxial with the diffuser pumps the liquid from the tank through passages in the disc into chambers defined by the vanes. This forms an emulsion of the gas and liquid in the chambers which is then ejected into the liquid in the tank. (Prague-FIRL)
W75-02576

EVALUATING THE OPERATION OF A DYEING AND LAUNDERING WASTE WATER PURIFICATION PLANT BASED ON THE USE OF ACTIVE SEDIMENT IN A CIRCULATION DITCH, (IN POLISH),
J. Malej.
Gaz Woda Tech Sanit. Vol 47, No 4, p 129-134. Illus. 1973.

Descriptors: *Industrial wastes, Dairy industry, Phenols, Dyes, Laundering, *Activated sludge, Municipal wastes.
Identifiers: Dye wastes, Laundry waste.

Purification of industrial sewage in circulation ditches has been analyzed with reference to dairy and phenol waste waters, but rarely is this method used for dyeing and laundering undertakings. A plan of the proposed sewage treatment system for a dyeing and laundering plant is included. The proposed active sediment circulation ditch consists of the following basic units: defibering unit located within the plant, equalizing reservoir for obtaining uniform sewage, secondary sediment basin and sediment drying fields. The proposed technical arrangement requires further study to determine the optimal proportion of other added municipal and industrial sewage. Since waste waters from this plant are carried into a river stocked with trout, toxicity of the sewage must be considered.--Copyright 1974, Biological Abstracts, Inc.
W75-02579

TREATMENT OF INDUSTRIAL WASTE WATER CONTAINING FRACTIONS FROM VACUUM DISTILLATION OF CRUDE OIL BY THE ACTIVE SEDIMENT METHOD, (IN POLISH),
Warsaw Univ. (Poland). Zaklad Microbiologica Wody Sci.
A. Bisz-Konarzewska, and M. Urvanska.
Gaz Woda Tech Sanit. Vol 47, No 7, p 244-247. Illus. 1973.

Descriptors: *Industrial water, *Activated sludge, Fuels, *Oil wastes.
Identifiers: Crude, Distillation, Fractions, Industrial, Method, Oil, Sediment, Treatment, Vacuum, Waste, Water, Oil refineries.

The composition of waste waters from crude oil refineries depends upon the type of crude oil and the technology of its processing. The content of such waste waters and their treatment are discussed. Currently the most frequently used treatment method is that of active sediment. The results of investigations on the influence of oil fractions P-20 (diesel oil) and P-21 (heavy diesel

oil) on the operation of active sediment and its adaptability to increased concentrations of the 2 fractions are presented. The laboratory method of preparing active sediment is described. Presence of fractions P-20 and P-21 concentrations of from 20-200 mg/l did not exert any negative influence on the work of active sediment. A distinct drop in the treating power of the sediment at concentrations of 500 mg/l and above was observed.--Copyright 1974, Biological Abstracts, Inc.
W75-02580

PROSPECTS OF FAUNAL-ECOLOGICAL INVESTIGATIONS ON ACTIVE SEDIMENT,
Institute of Public Utility Services, Warsaw (Poland).
H. Klimowicz.
Gaz Woda Tech Sanit. 47(5): 168-171, 1973.

Descriptors: *Biological treatment, *Activated sludge, *Bioindicators, Poland.
Identifiers: Kolkwitz-marsson system.

There is at present a lack of uniform sets of index organisms characteristic for specific steps of biological treatment of waste waters, making evaluation of the treatment at a given step difficult. The Kolkwitz-Marsson system is useful only with respect to saprophytes of natural water bodies; the difference between natural and artificial environments indicates that it is not possible to find analogous sets of species under various environmental conditions. The problem of defining a full list of bioindicator species for the various steps of waste water treatment thus remains open. The significance of biological treatment of waste waters is increasing in importance, but is limited due to this problem.--Copyright 1974, Biological Abstracts, Inc.
W75-02581

FEEDLOT MANURE AND OTHER AGRICULTURAL WASTES AS FUTURE MATERIAL AND ENERGY RESOURCES: III. ECONOMIC EVALUATIONS.
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5E.
W75-02588

A FEEDLOT WITHOUT WASTE,
P. D. Andre.
Beef, Vol 10, No 1, p 56-66, 69-70, Sept, 1973. 5 fig.

Descriptors: *Feed lots, *Farm wastes, *Cattle, *Confinement pens, *Recycling, *Waste treatment, *Waste disposal, Urine, Methane, Liquid wastes, Solid wastes, Solid wastes, Separation techniques, Feeds, Nitrogen, Dehydration, Costs, Arizona.
Identifiers: Refeeding, Sterilization.

A system or theory for the solution to the feedlot industry's manure problems has been devised by Dick Bunger who is the president of Corral Industries Inc. He has called this the 'Closed Ecological Cycle Feeding System.' As he sees it, feeding in the future must be in confinement buildings. This is because of the increasing scarcity of land, pollution regulations, and weather. His studies show that confinement feeding produces the same gains as an open feedlot, but it produces better gains during bad weather. This system first collects the waste and separates urine and feces. The liquids then go to a methane gas generator. The by-products of the liquids are then safe to be spread on land. By running the liquids through the gas generator, the nitrogen and other chemicals are reduced so that for a 10,000 head feedlot, instead of needing 4,204 acres for spreading the raw materials, only 200-500 acres would be required in one year's time. The solid matter is sterilized and then is incorporated into the feeding ration. (Russell-East Central)
W75-02590

GAS CHROMATOGRAPHIC ANALYSIS OF ODORS FROM DAIRY ANIMAL WASTES,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5A.
W75-02591

ENVIRONMENT PROTECTING CONCEPTS OF BEEF CATTLE FEEDLOT WASTES MANAGEMENT,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
L. R. Shuyler, D. M. Farmer, R. D. Kreis, and M. E. Hula.
National Animal Feedlot Wastes Research Program, Robert S. Kerr Environmental Research Laboratory, July, 1973. 283 p, 71 fig, 62 tab, 197 ref.

Descriptors: *Feed lots, *Farm wastes, *Design, Regulation, Legal aspects, Climates, Sites, Agricultural runoff, Slurries, Solid wastes, Liquid wastes, Waste storage, Waste treatment, Waste disposal, Management.
Identifiers: Environmental protection, *Pollution control, Waste management.

This report is meant to serve as a guide to insure consideration and incorporation of pertinent environmental pollution controls in the design and operation of beef cattle feedlots. The report is written to serve as a reference source for the more detailed information contained in published literature on feedlot design and operation. Feedlot design and waste management alternatives are presented. Aspects of feedlot site selection such as regulations, spatial requirements, topographic features, microclimates, soils and geological features, social considerations, and practical applications are discussed. Solid waste control and liquid waste technology is presented, and the economic consideration of each system is dealt with. The information and guidelines presented aren't restricted to cattle feedlots. They are also applicable to other segments of the animal industry. (Russell-East-Central)
W75-02593

REMOVAL OF NITRATES FROM POTABLE WATER BY ION EXCHANGE,
Negev Inst. for Arid Zone Research, Beersheba (Israel).
For primary bibliographic entry see Field 5F.
W75-02595

THE POULTRY PROCESSING INDUSTRY: A STUDY OF THE IMPACT OF WATER POLLUTION CONTROL COSTS,
Economic Research Service, Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-02608

COSTS OF FILTER PRESSING DOMESTIC SEWAGE SLUDGES,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
W. F. McMichael.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-226 130, $3.25 in paper copy, $2.25 in microfiche. December 1973. 18 p, 6 fig, 2 tab, 3 ref.

Descriptors: *Waste water treatment, *Sludge treatment, Sanitary engineering, Operating costs, Capital costs, Maintenance costs, Cost analysis, Filters.
Identifiers: Filtering systems.

Estimated capital and operating costs and operating and maintenance labor man hours, associated with filter pressing of two types of sludge are presented. Sludge types include: (a) all digested, mixed, primary and waste activated, and (b) raw primary. Two types of filter pressing equipment are presently available in the United States. The first utilizes an inert material, such as fly ash or incinerator ash, for filter precoating and lime and ferric chloride, along with ash, for sludge conditioning; the second does not employ precoating and recommends only lime and ferric chloride for sludge conditioning. A summary of commonly observed operating schedules for filtering plants of differing size is presented. Total treatment cost estimates for the two sludge types listed above range from 14-1.2 and 14-.79 cents/100 gal. for 1-10 mgd design capacity. Cycle time for each sludge type was four hours and two hours respectively. (Schroeder-Wisconsin)
W75-02626

OXYGEN ACTIVATED-SLUDGE WASTEWATER TREATMENT SYSTEMS: DESIGN CRITERIA AND OPERATING EXPERIENCE,
Union Carbide Corp., Tonawanda, N.Y. Linde Div., and Metcalf and Eddy, New York.
E. A. Wilcox, and A. Thomas.
EPA Technology Transfer Seminar Publication, August 1973. 46 p, 12 fig, 13 tab, 3 ref.

Descriptors: Annual costs, Operating costs, Capital costs, Waste water treatment, Oxidation, Activated sludge, Oxygen.
Identifiers: UNOX system, Detroit(Mich), Middlesex County(NJ), Oakland(Cal), Euclid(OH).

The design considerations and the cost effectiveness of substituting oxygen for air in the activated-sludge wastewater treatment process are suggested in this EPA sponsored report. The unox-system utilizes a covered and staged oxygen basin for the contact of oxygen gas and the mixed liquor. Mass transfer and mixing within each stage is accomplished through either surface aeration or within a submerged turbine rotating sponge system. Selection of the number of stages, the number of parallel biological reactors, and the type and size of mass transfer devices employed is a function of a number of elements including waste characteristics, land availability, treatment level requirements, clarifier overflow rates, etc. Performance summaries from a number of unox-system pilot-test sites are provided. Capital costs of providing the unox and air-activated sludge process were $83,580,000 and $104,020,000; $39,500,000 and $51,700,000; $47,000,000 and $56,000,000; and $10,000,000 and $12,000,000 for Middlesex County, New Jersey; Detroit, Michigan; Oakland, California; and Euclid, Ohio respectively. Annual operating costs were $7,390,000 and $8,290,000; $1,599,000 and $1,911,000; $4,000,000 and $4,900,000; and $1,120,000 and $1,180,000 respectively. The unox method may also yield advantages in sludge handling and ddisposal and odor control. (Schroeder-Wisconsin)
W75-02634

PHOSPHORUS REMOVAL COSTS,
Gore and Storrie Ltd., Toronto (Ontario).
G. Powell, and P. Crawford.
Water and Sewage Works, Reference Number, 1074, p R50-52; R54, R59-60, R62, R64, 1974. 8 fig, 2 tab, 8 ref.

Descriptors: *Waste water treatment, *Phosphorus, *Costs, Annual costs, Capital costs, Lime, Chemical precipitation, Operating costs.
Identifiers: Metallic salts.

While a number of methods may be utilized to remove phosphorus from waste waters, the most proven and reliable method is chemical precipitation using lime or metallic salts. Lime is typically applied prior to primary treatment although it can also be used in chemical tertiary treatment and the spent lime reclaimed. Annual amortized capital and annual operating costs for a bagged lime, bulk lime, or liquid lime slurry facility for a 1 mgd (Imp) primary treatment plant equaled $3,945 and

$19,905; $4,025 and $17,270; and $6,000 and $18,050 respectively. For a 250,000 gpd (lmp) plant total annual cost for the bagged and bulk facilities were equal. Metallic salts, alum and ferric chloride, supplied in either a liquid or dry form are also utilized to precipitate phosphorous. Annual capital and operating costs for a 1 mgd treatment facility using $30 of liquid chemical per mil gal (lmp) were $2,936 and $22,740. Application of metallic salt to activated sludge mixed liquor prior to final settling has also resulted in lesser chemical dosage than when added prior to primary treatment. Unlike lime, raw sludge volume increased considerably using metallic salts. Illustrations of each precipitation method are given. (Schroeder-Wisconsin)
W75-02637

FINANCING AND CHARGES FOR WASTEWATER SYSTEMS,
American Public Works Association, Chicago, Ill.; and Water Pollution Control Federation, Washington, D.C.
For primary bibliographic entry see Field 6C.
W75-02658

PHOSPHORUS REMOVAL FROM WASTEWATERS: A COST ANALYSIS,
Rensselaer Polytechnic Inst., Troy, N.Y.
I. J. Kumar, and N. L. Clesceri.
Water and Sewage Works, Vol 120, No 3, p 82-91, 1973. 8 tab.

Descriptors: *Waste water treatment, *Phosphorus, *Cost analysis, Cost comparisons, Pollution abatement, Treatment facilities.
Identifiers: Chemical precipitation, Lime, Aluminum salts.

Costs of chemical precipitation of wastewater phosphates are assessed. In addition to phosphate removal, chemical treatment can significantly reduce turbidity, BOD, COD, and suspended solids as well as removing some toxic heavy metals. Aluminum and iron salts have been used as chemical precipitants depending upon the cost of plant sites, the quantity required, availability of equipment, percent removal desired, and the type of sludge required. Lime is generally inexpensive but requires large dosages. Lime also can be reclaimed and may be used for nitrogen removal through ammonia. Aluminum salts such as alum or sodium aluminate generally cost more than lime but require lower dosages and will not retard biological activity. Iron salts also require lower dosages and the sludge produced is readily settleable. Three treatment methods--chemical treatment of raw sludge (pre-precipitation), simultaneous precipitation during biological treatment, and treatment of secondary clarifier effluent, are also assessed. Phosphorus can be removed from existing plants for a cost of 3.5 cents/1000 gallons to 8 cents/1000 gallons for 80% removal. (Schroeder-Wisconsin)
W75-02663

THE EFFECT OF LOW VOLUME AND HIGH VOLUME AERATION ON A HOG LAGOON,
North Dakota State Univ., Fargo. Dept. of Agricultural Engineering.
J. C. Converse.
MS Thesis, Department of Agricultural Engineering, May, 1966. 85 p, 44 fig, 5 tab, 19 ref.

Descriptors: *Hogs, *Farm wastes, *Waste treatment, *Lagoons, *Aeration, Temperature, Hydrogen ion concentration, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Ammonia, Nitrates, Nitrites, Sampling, Oxidation-reduction potential, Dissolved oxygen.
Identifiers: Total solids, Volatile acids.

The objectives of the study were to evaluate the effects of low and high volume subsurface aeration on a hog lagoon. Laboratory tests were run on low and high volume samples and control samples. Among factors tested were: Temperature, pH, BOD, COD, total and suspended solids, ammonia, nitrate, nitrite, ORP, volatile acids (high volume aeration) and DO (high volume aeration). The low volume subsurface aeration which ranged from 3.6 to 3.8 cfm had no measureable effect on the hog lagoon. For all of the tests conducted there appeared to be no significant difference between the means of the values obtained in the test for the aerated and the control cells. During the high volume aeration phase, an average of 2.28 mg/l of dissolved O2 was maintained in the aerated cell during the testing period. All of the tests showed a significant difference of the means, except the total solids, the suspended solids, the organic matter, and the ammonia. Based on the analysis of this experiment, it may be beneficial to aerate a hog lagoon with at least enough air to maintain some dissolved oxygen in the lagoon. The aeration would allow the lagoon to be loaded at a higher rate and still maintain aerobic conditions. Economical considerations may make this unfeasible. (Cartmell-East Central)
W75-02668

EQUALIZATION DESIGN TECHNIQUES FOR CONSERVATIVE SUBSTANCES IN WASTEWATER TREATMENT SYSTEMS,
Marquette Univ., Milwaukee, Wis. Dept. of Civil Engineering.
V. Novotny, and A. J. Englande, Jr.
Water Research (G.B.), Vol 8, No 6, p 325-332, June 1974. 7 fig, 1 tab, 25 equ, 11 ref, 2 appen.

Descriptors: *Basins, *Design, *Waste water treatment, *Water quality, Input-output analysis, Equations, Systems analysis, Mathematical models.
Identifiers: *Equalization, *Conservative substances, Mass balance.

Equalization is employed as a means of dampening extreme fluctuations in pertinent wastewater characteristics. Limits of variation are dictated by the nature of subsequent treatment processes and effluent quality requirements as imposed by regulatory authorities. This paper describes simplified design techniques for sizing equalization facilities based on various possible system inputs. A frequency response solution and spectral analysis of input-output data is employed as a basis of equalization basin design for a wastewater treatment system. Design equations for conservative substances are developed based on various possible system inputs including pulse, unit step function, harmonic and random signals. Practical applications and a design example are also discussed. (Bell-Cornell)
W75-02678

EFFECT OF SUSPENDED WASTES ON SYSTEM DESIGN,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
L-t. Fan, M-c. T. Kuo, and L. E. Erickson.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE6, Proceedings paper No 11018, p 1231-1247, December 1974. 11 fig, 34 equ, 18 ref.

Descriptors: *Activated sludge, *Waste treatment, *Environmental engineering, *Flocculation, *Suspended solids, *Dynamic programming, Water pollution control, Optimization, Kinetics, Biochemical oxygen demand, Systems analysis, Equations, Mathematical models.
Identifiers: Suspended sediments.

The optimum degree of primary treatment in an activated sludge process is investigated. A so-called parallel biochemical oxidation kinetic model, which takes into account the low metabolic rate and masking effect of suspended wastes, is employed to characterize the kinetics in the aeration chamber. Dynamic programming is used to determine the optimal primary clarifier detention time. The analysis shows that the optimal primary clarifier detention time depends on the concentration and masking characteristics of inlet suspended wastes, as well as on the concentration of inlet soluble substrate. The optimal primary clarifier detention time in the case with flocculent is greater than that in the case without flocculation. The reduction in the optimal total construction cost by flocculation is substantial when the masking effect is large. (Bell-Cornell)
W75-02682

ECONOMIC DESIGN OF LOW PRESSURE AIR PIPING SYSTEMS,
Minnesota Mining and Mfg. Co., St. Paul.
J. M. Osborne.
Journal of the Environmental Engineering Division, American Society of Civil Engineers Vol 100, No EE6, Proceedings paper No 11031, p 1263-1277, December 1974. 1 fig, 11 tab, 14 equ, 4 ref.

Descriptors: *Pipelines, *Transportation, *Environmental engineering, *Marginal benefits, *Optimization, Waste water treatment, Design, Methodology, Piping systems(Mechanical), Benefits, Costs, Equations, Systems analysis.
Identifiers: *Low pressure, *Diffused air piping, *Computation, *Economic analysis.

With the aid of marginal economic optimization theory and headloss approximation equations for low pressure air systems, an economic design technique is presented for wastewater treatment plant diffused air piping, in specific, and all low pressure gas systems, in general. Basically, the approach is to identify major tradeoffs, categorize them either as benefits or costs, and then optimize by expending cost increments until the accrued incremental benefit approximately equals the last cost increment. The discrete nature of commercially available pipe sizes greatly simplifies the optimization process. Sensitivity of the technique to a number of parameters, e.g., interest rate, project life, power cost, is investigated and an example problem is solved. Economic velocities are shown to be defective as a design tool for air piping. (Bell-Cornell)
W75-02684

EFFECTS OF SUSPENDED SOLIDS ON PRIMARY CLARIFIER SIZE OPTIMIZATION,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
M-C. T. Kuo, L. T. Fan, and L. E. Erickson.
Journal Water Pollution Control Federation, Vol 46, No 11, p 2521-2535, November 1974. 14 fig, 2 tab, 22 equ, 18 ref.

Descriptors: *Activated sludge, *Waste water treatment, *Water pollution control, *Simulation analysis, *Suspended solids, *Design, *Size, Optimization, Estimating, Mathematical models, Systems analysis, Equations.
Identifiers: *Primary clarifier, *Kinetic models, Soluble substrate, Oxidation rates, Masking effect, Experimental data.

A newly proposed, parallel, biochemical oxidation kinetic model for soluble substrate and suspended waste removal in activated sludge process is considered; masking effect coefficient is defined to characterize the suspended wastes' inhibitory effect on the removal of soluble substrates. The simulation of an activated sludge system is carried out; the new kinetic model is applied to the design of the primary clarifier. Results indicate that both the concentration and masking effect of suspended wastes in wastewater are important factors in sizing the primary clarifier. The optimal size of the primary clarifier, which leads to the minimum total volume or total construction cost, increases as the concentration and the masking characteristics of the influent suspended wastes increase. (Bell-Cornell)
W75-02685

ACTIVATED SLUDGE HYDRAULIC-CONTROL TECHNIQUES EVALUATION BY COMPUTER SIMULATION,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
R. E. Roper, Jr., and C. P. L. Grady, Jr.
Journal Water Pollution Control Federation, Vol 46, No 11, p 2565-2578, November 1974. 13 fig, 1 tab, 13 equ, 20 ref.

Descriptors: *Activated sludge, *Hydraulics, *Control, *Waste water treatment, *Water quality, *Simulation analysis, Computers, Mathematical models, Operations research, Equations, Evaluation.
Identifiers: Process control, Treatment plants.

Recent advances toward the understanding of microbial kinetics and sludge settling provide the possibility to assess the efficacy of several hydraulic control strategies by combining interacting models for the two separate functions of substrate removal and liquids-solids separation. A combined model, consisting of a bio-oxidation, a clarification, and a thickner model, was prepared and used to simulate the steady-state performance of the activated sludge process over a range of 1,600 different operational conditions. The study showed that the loss of sludge solids in the final effluent makes a significant contribution to the sludge age of the system so that the direct use of theoretically based hydraulic formulas may lead to serious errors in control. Possible errors may be offset, however, by a simple hydraulic control strategy. This strategy states that the sludge age can be controlled at a relatively constant value by fixing the wastage rate and recycling a constant fraction of the influent flow. It states also that the sludge age will not be greatly affected by changes in the recycle ratio as long as the wastage flow rate is changed appropriately. (Bell-Cornell)
W75-02686

REGRESSION ANALYSIS APPLIED TO THE WASTEWATER TREATMENT FIELD,
Kentucky Univ., Lexington, Dept. of Economics.
J. R. Marsden, D. E. Pingry, and A. Whinston.
Journal Water Pollution Control Federation, Vol 45, No 10, p 2104-2109, October 1973. 1 tab, 12 ref.

Descriptors: *Regression analysis, *Waste water treatment, *Water quality control, *Activated sludge, *Operating costs, Economics, Technology, Estimating, Decision making, Mathematical models, Cost analysis, Systems analysis.
Identifiers: *Cost functions, *Historical summaries.

Presented is some initial work on developing operating cost functions for activated sludge waste treatment plants in a framework allied with economic developments. Three alternative functional forms that might be used are detailed, noting some of the specific economic implications and restrictions of each. Considered are: general exponential; generalized quadratic; and constant cost elasticity of substitution. Each of the three forms allows cost factor interactions and substitutability. Using differing time period data, tests have been developed for considering such questions as shifts in technology and productivity. The general exponential form is the easiest of the three to deal with for estimation purposes; it is easily transformed to a log-linear form, and direct, ordinary least squares can be applied. Presented are the results of a regression analysis using general exponential cost function forms, for which data was provided by the Board of Health of the State of Indiana. Dependent variables used were payroll plus electricity and water plus other expenses. Cost functions considered were: million gallons of wastewater treated; treatment load; and percent of design capacity used by the plant. Finally, the paper discusses the use of such results, what limitations regression estimation results possesss in general, and what alternative methods may be used to provide details necessary for policy planning decisions. (Bell-Cornell)
W75-02687

WATER PURIFICATION PLANT.
Belgian Patent BE 810-790. Issued May 29, 1974.
Derwent Belgian Patents Report, Vol 5, No 26, p 1, August, 1974.

Descriptors: *Patents, *Water purification, Water treatment, Flocculation, Filtration, Sedimentation tanks, Weirs, Europe.
Identifiers: Treatment plants, Czechoslovakia, Purification tanks, Concentric cells, Multiple-cell tanks.

A water purification plant, using multi-cellular single tanks, with each cell in a concentric, circularly symmetrical configuration within a common pit is described. The plant consists of a flocculation chamber which widens as it deepens, communicating via a gap with a filtration compartment which widens from the base upwards. This in turn is connected by a weir with a sedimentation tank and guide walls. Clear water is collected in a common chamber above the filtration chambers. The arrangement is useful for large scale water treatment. (Prague-FIRL)
W75-02693

BIOLOGICAL DEGRADATION SEWAGE TREATMENT PLANT.
French Patent FR 2201-259. Issued May 31, 1974.
Derwent French Patent Abstracts, Vol 5, No 27, p 3, August, 1974.

Descriptors: *Patents, *Denitrification, *Sewage treatment, *Biological degradation, Treatment, Effluents, Tanks, Biological treatment, Waste treatment, Recycling, Waste water treatment, Sewage effluents, Europe.
Identifiers: Treatment plants, Tank capacities, France.

The main treatment tank of a biological degradation sewage treatment plant has feed pipes along one side for partly processed raw sewage. These are parallel to the surfaces of the discs and effluent pipes of the other side. The effluent is completely recycled once to three times through a preceding denitrification tank, into which the settled/decanted sewage is fed simultaneously. The handling capacities of both stages are related to disc area. In the case of the main tank, the capacity is 1.6 to 10.0 cu cm per sq cm per day, where the atmosphere above the sewage is oxygen enriched to 30 to 60 volume percent. In the denitrification tank, capacity is 16 to 64 cu cm per sq cm per day. (Prague-FIRL)
W75-02694

PUMPS FOR SEWAGE TREATMENT PROCESSES,
For primary bibliographic entry see Field 8C.
W75-02695

HANDLING, PREPARATION, AND APPLICATION OF POLYELECTROLYTES,
A. Elphick, and L. J. Lake.
Effluent and Water Treatment Journal, Vol 14, No 5, p 378-382, July, 1974. 3 fig, 5 ref.

Descriptors: *Polyelectrolytes, *Sewage treatment, *Polymers, *Emulsions, Fillers, Electrolytes, Cohesion, Cellulose, Waste water treatment, Water purification, Potable water, Effluents, Sewage effluents.
Identifiers: Great Britain, Liquid polyelectrolytes, Alginates, Starches, Polyacrylamide, Polyacrylic acid, Water clarification.

A wide range of polyelectrolytes and polymer emulsions are available for use in Great Britain. Differing compounds were examined for their feedability, ease in mixing with water, and solubility, as well as parameters for the resulting solution such as viscosity and pH. Natural polyelectrolytes include the alginates, modified starches and cellulosic materials. Synthetic polyelectrolytes are usually based on polyacrylamide and its co-polymers with polyacrylic acid. The functions of polyelectrolytes in industry and waste water treatment include clarification aids in potable water and effluent treatment, conditioners in sewage and other sludge thickening, and filter aids in processed materials. In all cases, the polyelectrolytes act to bring about a cohesion between particles in the water. Most recently, the introduction of liquid polyelectrolytes in the form of emulsions has occurred. Their application and preparation techniques include aging, metering, and dilution, the same steps necessary for preparation of previously used solutions made from powder. (Prague-FIRL)
W75-02700

NITROGEN MOVEMENT RESULTING FROM SURFACE APPLICATION OF LIQUID SEWAGE SLUDGE,
Georgia Agricultural Experimental Station, Athens.
For primary bibliographic entry see Field 5B.
W75-02701

SEWAGE TREATMENT SLUDGE CONCENTRATING PLANT--WITH IMPROVED HEAT RECOVERY FROM TREATED CONCENTRATE TO INCOMING RAW SLUDGE.
Belgian Patent BE 808-258. Issued June 5, 1974.
Derwent Belgian Patents Report, Vol 5, No 25, p 1, July, 1974.

Descriptors: *Patents, *Sewage treatment, *Heat recovery, *Sewage sludge, Pressure, Equipment, Sludge, Heat exchangers, Europe.
Identifiers: Sewage sludge treatment plants, Concentrating plants, Belgium.

The raw sludge is pumped at high pressure by an indirect heat exchanger into a reactor vessel. This vessel delivers treated sludge back through the heat exchanger to yield heat to incoming raw sludge. A pressure reducing device is then fitted between the heat exchanger and the reactor so that the pressure of incoming sludge can be held well above the reactor pressure. The sludge in the heat exchanger can also be raised to a correspondingly higher temperature without danger of blocking. (Prague-FIRL)
W75-02702

CONDUIT WITH INTERNAL DRAIN,
Modine Mfg. Co., Racine, Wis.
For primary bibliographic entry see Field 8A.
W75-02703

COSTS OF CONSTRUCTION OF PUBLICLY-OWNED WASTEWATER TREATMENT WORKS. 1973 'NEEDS' SURVEY.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6C.
W75-02704

THE DUAL FUNCTIONING SWIRL COMBINED SEWER OVERFLOW REGULATOR/CONCENTRATOR,
National Environmental Research Center, Cincinnati, Ohio.
R. Field.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-227 182, $4.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency Report No EPA 670/2-73-059, September, 1973. 49 p, 16 fig, 2 tab, 13 ref.

Descriptors: *Laboratory tests, *Separation techniques, *Mathematical models, *Waste water treatment, Overflows, Combined sewers, Flow

control, Weirs, Design criteria, Storm drains, Storm runoff, Urban runoff, Sanitary engineering, Sewage treatment, Solid wastes.
Identifiers: *Swirl regulator/concentrator.

A hydraulic laboratory pilot project was run in conjunction with mathematical modeling to refine and demonstrate the swirl flow regulator/solids-liquid separator. The simple, annularly shaped device requires no moving parts and provides the dual function of regulating flow by a central circular weir while simultaneously treating combined waste water by a swirl action. The low-flow concentrate is diverted via bottom orifice to the sanitary sewerage system for subsequent treatment at the municipal works while the relatively clear liquid overflows the weir into a central downshaft and receives further treatment or is discharged to the stream. The device is capable of functioning efficiently over a wide range of combined sewer overflow rates, and can effectively separate suspended matter at a small fraction of the detention time required for conventional sedimentation or flotation. (Sandoski-FIRL)
W75-02706

THE PREPARATION AND OXIDATION PROPERTIES OF FERRATE ION (FE04 2-). STUDIES DIRECTED TOWARDS ITS USE AS A WATER PURIFYING AGENT, PHASE I,
Missouri Univ., Columbia. Dept. of Chemistry.
R. K. Murmann.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 057, $3.75 in paper copy, $2.25 in microfiche. Completion Report, Missouri Water Resources Research Center, Columbia, October 1974. 45 p, 7 fig, 5 tab, 2 ref. OWRT B-091-MO(1). 14-31-0001-3905.

Descriptors: *Water purification, *Oxidation, *Chemical precipitation, *Iron compounds, *Waste water treatment, Chemical reactions, Separation techniques, *Water treatment, Ions.

Both potassium ferrate and sodium ferrate have been prepared in the pure solid state (99% purity) and in a solution with the alkali hydroxides. The solids are stable for years in the absence of water, and are relatively stable in alkali metal hydroxide solutions. They are produced by oxidation of iron metal or rust electrochemically in an alkaline metal hydroxide solution. This solution can be used directly to treat water. Thus in a purification plant Na2FeO4 can be generated and used at the plant. The decomposition of Na2FeO4 in deep-well and river water reduces the amount of iron, manganese, cadmium, mercury, lead, cobalt, nickel and arsenic to less than detectable quantities. About 50ppm is required. Colloidal impurities in the water are quickly settled after the treatment with Na2FeO4. Some organic matter is removed but if the water is essentially free of organic matter O2 is generated and dissolves in the solvent. It is essentially equally effective on a mole basis to Cl2 in destroying selected bacteria and virus.
W75-02707

METHOD OF MAKING AND PIPELINE TRANSPORTING A NON-CORROSIVE SULPHUR-WATER SLURRY,
R. J. Horvath.
Canadian Patent 950,944. Issued July 9, 1974. Canada Patent Office Record, Vol 102, No 28, p 76, July 1974.

Descriptors: *Patents, *Pipelines, *Slurries, Ammonia, Equipment, *Waste water treatment, *Liquid wastes, Corrosion control.
Identifiers: *Sulphur-water slurries, Transport.

A method of making and transporting a sulphur-water slurry by pipeline is described. This maintains a non-corrosive and non-clogging process by keeping a passivating film of ammonia between the sulphur-water slurry and the interior wall of the pipeline or contacting equipment. Ammonia is injected into the slurry line under such conditions that a passivating film of ammonia is maintained between the interior of the pipeline wall and the sulfur-water slurry transported in the pipeline. By this precaution, hot corrosion and clogging of the pipeline can be inhibited or prevented. (Prague-FIRL)
W75-02715

LIQUID COLLECTING AND FILTERING DEVICE,
Upjohn Company, Kalamazoo, Mich. (assignee)
R. F. Le Roy.
United States Patent 3,814,079. Issued June 4, 1974. Official Gazette of the United States Patent Office, Vol 923, No 1, p 112, June 1974.

Descriptors: *Patents, *Filters, *Liquid wastes, *Filtration, Tubes, Pressure, Equipment, *Waste water treatment.
Identifiers: Ambient pressure.

A pair of telescopically arranged tubes defines an expansible, closed chamber in which the pressure is initially and substantially below ambient pressure. The inner tube has an inlet end with a perforable closure member and an outlet end which communicates with the outer tube. A cannula is supported upon the inlet end for movement between a position spaced from the closure member and a position penetrating through the closure member to communicate with the chamber. A filter means is disposed in the inner tube so that liquid moving from the inlet end through the outlet end or the inner tube must pass through the filter. (Prague-FIRL)
W75-02716

METHOD OF FILTERING,
Hydromation Filter Co., Livonia, Mich. (assignee)
G. Hirs.
United States Patent 3,814,247. Issued June 4, 1974. Official Gazette of the United States Patent Office, Vol 922, No 1, p 155, June 1974. 1 fig.

Descriptors: *Patents, *Filters, Specific gravity, Recirculated water, *Filtration, *Waste water treatment.
Identifiers: Deep bed filters, *Backwashing.

A liquid filtering method for operating an apparatus comprises a deep bed of dual, vertically separate, granular filter media beds. The first filter media bed has relatively coarse grains--in the size range of 0.050 to 0.375 inches--which have a specific gravity in the range of 0.9 to 1.6. The second filter media bed, which underlies the first bed, has finer grains which have a specific gravity greater than 2.1. Upon backwashing, the first bed is slurried and turbulently recirculated through a path external of the retaining vessel, while the second bed is only expanded. After backwashing, the filter media beds assume their original respective orientations. (Prague-FIRL)
W75-02717

PURIFIER DEVICE,
For primary bibliographic entry see Field 5F.
W75-02718

APPARATUS FOR TREATING NOXIOUS EFFLUENTS,
Trayler and Trayler, Wheelersburg, Ohio. (assignee)
R. L. Solomon.

Descriptors: *Patents, *Waste water treatment, Effluents, Burning, Discharge(Water), Liquids, Toxicity, Treatment facilities, *Incineration, *Air pollution effects.
Identifiers: Furnace, Burner, Scrubbing fluid.

An uncomplicated structure which lends itself to unskilled manual operation for treating the output of a furnace or burner is described. The furnace output is cooled, directed and forced into a treating tank containing a scrubbing fluid, and exposed to a burner flame before being discharged into the atmosphere. The system is of particular use in ensuring that the output from the burner or furnace contains no noxious effluents. (Prague-FIRL)
W75-02720

REMOVAL OF MERCURY FROM MERCURY CATHODE SLUDGE,
Environmental Protection Agency, Washington, D.C. (assignee)
D. G. Rachor, and R. A. Perry.
United States Patent 3,814,685. Issued June 4, 1974. Official Gazette of the United States Patent Office, Vol 923, No 1, p 264, June, 1974.

Descriptors: *Patents, *Mercury, Acid, Waste water treatment.
Identifiers: *Mercury cathode sludge, *Acid treatment, Roasting.

Mercury is recovered from mercury cathode sludge by treating the sludge with acid and then roasting. The mercury content of the residue becomes significantly lower by this process than when the acid treatment step is omitted. (Prague-FIRL)
W75-02721

HEAVY METAL REMOVAL WITH STARCH XANTHATE-CATIONIC POLYMER COMPLEX,
Agricultural Research Service, Peoria, Ill. Cereal Products Lab.
R. E. Wing, C. L. Swanson, W. M. Doane, and C. R. Russell.
Water Pollution Control Federation Journal, Vol 46, No 8, p 2043-2047, August 1974. 4 tab, 12 ref.

Descriptors: *Separation techniques, *Cations, *Polymers, *Demineralization, *Heavy metals, Chemical reactions, Mercury, Water pollution, Industrial wastes, Effluents, Manganese, Zinc, Wastes.
Identifiers: Starch xanthate-PVBTMAC, Xanthate treatment.

The removal of several common metal ions by starch xanthate-PVBTMAC was compared to the commonly used method of treatment with base. The determinations were made on solutions of the single ions, on solutions containing all ions, and on two untreated industrial effluents. Removal of the single ions of most metals with starch xanthate-PVBTMAC far exceeded that which could be obtained with base alone. The removal of a mixture of metals by the process was also generally superior. The industrial effluents contained metals (Fe, Mn, Zn) for which the xanthate treatment was less effective. The residuals were also compared to the stringent Illinois discharge limits. Advantages of the xanthate treatment included: simple recovery; small volume of sludge compared to lime treatment; the physical nature of the sludge is not gelatinous; removal of suspended solids before treatment is not necessary; pH control is not as important as with the base treatment; only a slight excess of reagent is necessary. Cd(2+), Cr(3+), Cu(2+), Pb(2+), Hg(2+), Ni(2+), and Ag(+) were essentially completely removed by the xanthate treatment. Considerable amounts of Fe(2+), Mn(2+), and Zn(2+) were removed at large initial concentrations, but residual levels exceeded Illinois effluent limits. (Pulliam-Vanderbilt)
W75-02732

HOW TO MINIMIZE POLLUTION FROM METAL PREFINISHING LINES,
Amchem Products, Inc., Ambler, Pa. Hydro-Fax Div.
J. Carroll, and R. F. Reeves.
Industrial Water Engineering, Vol 11, No 3, p 21-24, May/June, 1974.

Descriptors: *Industrial wastes, *Water pollution sources, *Pollution abatement, *Metals, Industrial plants, Chemical wastes, Acids, Waste water treatment.
Identifiers: Metal prefinishing lines.

A comprehensive influent/effluent study should be conducted when industrial treatment schemes are considered to avoid creation of more problems elsewhere in the plant. Care for the treatment system selected will help keep it operating constantly to control pollution. Methods which have been used successfully to reduce pollution include use of biodegradable cleaners which contain no phosphates and deoxidizers and final rinses that are chrome-free. Coil coating installations can take advantage of a new chromate conversion coating that requires no subsequent rinsing. A thin film is applied and dried without further rinsing. Automatic replenishment of pretreatment systems can reduce sludge formation, extend bath life, and minimize rinse water consumption. Contamination by drag-out from previous stages can be minimized by long drain areas or air-knives. Introducing concentrates contamination in the first rinse, making the outflow from this stage easier to treat. In certain cases the installation of ion-exchange equipment for rinse waters can be economically justified. Proper maintenance, sludge filtration and bath stabilization can extend bath life. (Pulliam-Vanderbilt)
W75-02738

PROCESS FOR REMOVING MOLYBDENUM FROM AQUEOUS INDUSTRIAL EFFLUENTS AND FOR REDUCING THE LEVEL OF AVAILABLE MOLYBDENUM IN SOILS IN AREAS OF MOLYBDENUM TOXICITY,
Colorado Univ., Boulder.
D. R. Runnells.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-224 121, $3.25 in paper copy, $2.25 in microfiche. October, 1973. 4 p, 1 fig. 73-5-ESR-P21-1100.

Descriptors: *Molybdenum, *Industrial wastes, *Pollution abatement, Effluents, *Toxicity, Copper, Iron, *Waste treatment procedures, *Arizona, *Soils.

Various amounts of dissolved ferric chloride were added to known volumes of aqueous effluents from certain copper mines in Arizona. An attempt was made to determine the ratio of iron to molybdenum that would effect the best possible removal of molybdenum. The greatest removal of molybdenum occurred when the ratio of iron to molybdenum was greater than 25 to one with no pH adjustment and a settling time of approximately one day. These experiments demonstrated that the level of dissolved molybdenum can be reduced by as much as 97% in aqueous industrial effluents simply by adding inexpensive ferric chloride and allowing time for settling. (Merville-Vanderbilt)
W75-02739

TRACE METAL REMOVAL,
Dallas Water Utilities Dept., Texas.
S. E. Esmond, and A. C. Petrasek, Jr.
Industrial Water Engineering, Vol 11, No 3, p 14-17, May-June, 1974. 9 tab.

Descriptors: *Water reuse, *Activated sludge, *Metals, Nitrification, Lime, *Waste water treatment, Biological treatment, Activated carbon, Texas, Trace elements.
Identifiers: Dallas demonstration plant(Tex), *Trace metals.

The City of Dallas, with the assistance of Texas A and M University, has contracted with EPA to study heavy metals removals at the Dallas Demonstration Plant. The first phase of operation is considered, which involves both a biological/physical and a biological/chemical/physical (AWT) sequence. The Biological Sequence consists of an activated sludge process fed by primary effluent from a Dallas treatment plant, followed by multimedia filtration. The AWT sequence includes the same activated sludge process, followed by highlime (pH 11.5) treatment, miltimedia filtration, and granular activated carbon adsorption. The filtered activated sludge did not appear vastly different from the AWT effluent, but the coliform populations of the two waters were roughly 100,000 and 0, respectively. Also, the highlime process was responsible for destruction of other biological entities in addition to removal of color, turbidity, and heavy metals. The metals included: As, Ba, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Se, and Zn. Activated sludge effected higher removals than the filter, but removal by the filter was quite high in terms of cost-effectiveness. A least-squares linear fit of all the available monthly data produced a fairly high negative correlation coefficient between the degree of metals removal and the degree of nitrification. (Pulliam-Vanderbilt)
W75-02741

5E. Ultimate Disposal Of Wastes

THE LAND CAN BE RETURNED.
For primary bibliographic entry see Field 5D.
W75-02210

HEAPS AND HOLES.
For primary bibliographic entry see Field 5D.
W75-02232

DEHYDRATED POULTRY WASTE AS A FEED FOR MILKING COWS AND GROWING SHEEP,
Michigan State Univ., East Lansing. Dept. of Dairy Science.
For primary bibliographic entry see Field 5D.
W75-02243

PRIORITIES IN SELECTING DAIRY FACILITIES,
Kentucky Univ., Lexington.
For primary bibliographic entry see Field 5D.
W75-02246

NUTRIENT RECYCLING BY LAYING HENS,
Texas A and M Univ., College Station. Dept. of Poultry Science.
For primary bibliographic entry see Field 5D.
W75-02250

SOME CHEMICAL AND PHYSICAL ASPECTS OF PHOSPHATE PRECIPITATION FROM ANAEROBIC LIQUORS DERIVED FROM ANIMAL WASTE TREATMENT LAGOONS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-02252

SOLIDS-LIQUID SEPARATION: AN IMPORTANT STEP IN THE RECYCLING OF DAIRY COW WASTES,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-02273

WASTE HANDLING AND DISPOSAL GUIDELINES FOR INDIANA BEEF PRODUCERS.
For primary bibliographic entry see Field 5D.
W75-02300

METHANE RECOVERY FROM CHICKEN MANURE DIGESTION,
Drexel Univ., Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W75-02303

MANURE GOOD 'PINCH HITTER' FOR COMMERCIAL FERTILIZER.
For primary bibliographic entry see Field 5D.
W75-02307

DEHYDRATION OF ANIMAL WASTES FROM LIVESTOCK MARKETS,
Agricultural Research Service, Peoria, Ill. North Central Region.
For primary bibliographic entry see Field 5D.
W75-02312

EVERYTHING IS ON SLATS,
For primary bibliographic entry see Field 5D.
W75-02319

ANOTHER RECYCLING VENTURE.
For primary bibliographic entry see Field 5D.
W75-02322

COMPOSTED MANURE CALLED 'AVAILABLE FUEL SOURCE'.
For primary bibliographic entry see Field 5D.
W75-02323

PROCEEDINGS: BIG ISLAND SWINE CONFERENCE, CURRENT AND FUTURE TRENDS IN SWINE WASTE MANAGEMENT.
For primary bibliographic entry see Field 5D.
W75-02324

BASIC REQUIREMENTS OF HOG PEN CONSTRUCTION AND LIQUID MANURE DISPOSAL,
Hawaii State Dept. of Health, Honolulu.
J. Nakahara.
In: Proceedings: Big Island Swine Conference, Current and Future Trends in Swine Waste Management, September 11, 1971, Miscellaneous Publication 82, Cooperative Extension Service, University of Hawaii, p 6-7, (1971).

Descriptors: *Confinement pens, Construction, *Hogs, Liquid wastes, *Waste storage, *Waste disposal, *Hawaii, Cesspools, Septic tanks, Lagoons, *Farm wastes, *Waste treatment.

Many problems of waste disposal have originated from confinement hog feeding. To alleviate these problems the first consideration is construction of feeding facilities. Floors, feed troughs, and gutters should be constructed so that they are impervious to water and can be properly flushed with water. Loose boards should not be used unless they can be easily removed. Feed bins and pens should be constructed so that they are rodent-proof. Presently, four methods of liquid disposal are commonly used. Cesspools and septic tanks can be utilized in small operations, but aren't feasible in large ones. Fertilizer can be spread, but a large land area is required. Lagoons can be constructed but should be in accordance with guidelines established by the Department of Health. Adequate manure disposal can be controlled by proper design and maintenance of lagoons. However, in Hawaii, lagoons are often undersized because of the scarcity of land. Regardless of the type of waste disposal used, it must not only prevent health hazards, but also prevent aesthetic nuisances. (See also W75-02324) (Russell-East Central)
W75-02326

HOG PRODUCTION ZONING REQUIREMENTS,
For primary bibliographic entry see Field 5D.
W75-02327

SWINE HOUSING AND WASTE DISPOSAL DESIGNS,
For primary bibliographic entry see Field 5D.
W75-02329

SUMMARY AND CONCLUSION,
For primary bibliographic entry see Field 5D.
W75-02332

SOLID MANURE HANDLING FOR LIVESTOCK HOUSING, FEEDING AND YARD FACILITIES IN WISCONSIN,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.
For primary bibliographic entry see Field 5D.
W75-02333

DIGESTIBILITY OF FEEDLOT WASTE,
For primary bibliographic entry see Field 5D.
W75-02338

DOUGLAS FIR BARK AS A TRICKLING FILTER MEDIUM FOR ANIMAL WASTE DISPOSAL SYSTEMS,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 5D.
W75-02339

AGRICULTURAL WASTE UTILIZATION VERSUS DISPOSAL,
DeKalb AgResearch, Inc., Ill.
For primary bibliographic entry see Field 5D.
W75-02340

DPW FOR FEED, SHORTCOMINGS AS FEED INGREDIENT,
Cornell Univ., Ithaca, N.Y. Dept. of Poultry Science.
For primary bibliographic entry see Field 5D.
W75-02343

SUPPORT SYSTEMS TO DELIVER AND MAINTAIN OIL RECOVERY SYSTEMS AND DISPOSE OF RECOVERED OIL,
Battelle Columbus Lab., Ohio.
For primary bibliographic entry see Field 5G.
W75-02374

THE MOVEMENT OF EFFLUENT FROM THE CITY OF MIAMI SEWAGE OCEAN OUTFALL,
Miami Univ., Fla. Sea Grant Institutional Program.
R. D'Amato.
Sea Grant Technical Bulletin No 27, August, 1973. 91 p, 23 fig, 7 tab, 38 ref. NOAA Sea Grant No 2-35147.

Descriptors: *Effluents, *Outlets, *Waste water treatment, Waste discharge, Tertiary treatments, Water reuse, Treatment facilities, Biochemical oxygen demand, Oceans, Florida.
Identifiers: *Miami, Treatment plants.

It is maintained that the present discharge location is completely unacceptable and that the following recommendations are made from the evaluation presented. Until major alternations are made on the Miami Sewage Treatment Plant, improved practices need be initiated at the plant itself. Furthermore, that waste water treatment plant effluents be discharged between 300 and 400 feet through diffusers and that treatment procedures should be increased at least to the state law requirements of 90 percent BOD removal for all ocean outfalls. Finally, serious consideration should be given to advanced waste treatment and water reuse systems and that present and planned treatment facilities be prepared for eventual transfer to water reuse. (Sandoski-FIRL)
W75-02559

TECHNOLOGY AND ENVIRONMENTAL CONCERNS.
Department of Energy, Mines and Resources, Ottawa (Ontario).
For primary bibliographic entry see Field 5B.
W75-02561

NEW CONCEPTS FOR DAIRY WASTE MANAGEMENT,
California Univ., Los Angeles. School of Public Health.
For primary bibliographic entry see Field 5D.
W75-02573

FEEDLOT MANURE AND OTHER AGRICULTURAL WASTES AS FUTURE MATERIAL AND ENERGY RESOURCES: III. ECONOMIC EVALUATIONS.
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
W. P. Walawender, L. T. Fan, C. R. Engler, and L. E. Erickson.
Contribution Number 33, Department of Chemical Engineering, Kansas Agricultural Experiment Station, Manhattan, July 1, 1973, 23 p, 9 tab, 45 ref. Ch. E 0880.

Descriptors: *Feed lots, *Farm wastes, *Recycling, *Energy, *Waste treatment, *Waste disposal, Economics, Costs, Transportation, Carbon dioxide, Water, Methane, Cost-benefit analysis.
Identifiers: *Manure, *Agricultural wastes, *Liquefaction, *Gasification, *Hydrogasification, *Oil conversion, Cellulosic wastes, Processing, Synthesis gas process.

Due to increasing waste problems and energy demands, a study of the feasibility of chemical processing of agricultural wastes was undertaken. The study dealt primarily with feedlot manure because of its availability and its present hazards to environmental quality. This report presents the results of an economic analysis of three potential processing schemes for the conversion of feedlot wastes to useful products. The processes include (1) liquefaction to oil, (2) gasification to synthesis gas, and (3) hydrogasification to methane. Processing costs, on a per ton of wet manure feed basis, were found to be $4.27, $1.53, and $9.41, respectively. (These costs include credit only for the sale of the major product at approximately current prices.) Capital investment and the breakeven sales price for the major product are presented. The results strongly favor the synthesis gas process; however, markets for the product require further consideration. (Russell-East Central)
W75-02588

HOUSING AND SHELTER FOR FEEDLOT CATTLE,
Minnesota Univ., St. Paul.
J. C. Meiske, R. E. Smith, R. D. Goodrich, and H. E. Hanke.
Feedlot Management, 1973 Cattle Feeder's Planner, November, 1973, p 44-52, 84, 5 fig, 3 tab.

Descriptors: *Feedlots, *Cattle, *Confinement pens, Costs, Economics, Performance, Farm wastes, Feeding weather, Design, Management.
Identifiers: Open confinement shed, Open lot, Manure pack system, Insulated confinement barn, Open shed.

In the selection of a feedlot facility, consideration must be given to factors such as weather, pollution control regulations, the need to save labor, and the desire to eliminate bedding and to provide an environment which would enable cattle to have improved feed efficiencies and faster gains. Five types of feedlot facilities were studied. These were: (1) the open confinement shed; (2) the manure pack system; (3) the conventional open shed; (4) the enclosed insulated confinement barn; and (5) the open lot unit. The lowest cost per head system is the open lot unit, and the most expensive is the insulated confinement building. However, no particular system is superior to all others. Each system's success is dependent on a particular set of circumstances and, with all systems, good construction and alert management are necessary for consistent returns. (Russell-EastCentral)
W75-02589

A FEEDLOT WITHOUT WASTE,
For primary bibliographic entry see Field 5D.
W75-02590

GAS CHROMATOGRAPHIC ANALYSIS OF ODORS FROM DAIRY ANIMAL WASTES,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5A.
W75-02591

ENVIRONMENT PROTECTING CONCEPTS OF BEEF CATTLE FEEDLOT WASTES MANAGEMENT,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5D.
W75-02593

ALTERNATIVES TO THE MANAGEMENT OF HAZARDOUS WASTES AT NATIONAL DISPOSAL SITES.
Arthur D. Little, Inc., Cambridge, Mass.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-225 164, $4.75 in paper copy, $2.25 in microfiche. Final report EPA/530/SW-46C, 1973. 94 p, 14 fig, 11 tab.

Descriptors: *Heavy metals, *Waste disposal, Chemical wastes, Pesticides, Organic compounds, Chlorinated hydrocarbon pesticides, Cost comparisons, Analytical techniques, Hazards, Risks, Explosives, Capital costs, Operating costs, Decision making.
Identifiers: Hazardous wastes, Cyanides.

Technical, economic, risk and legal aspects of three alternative hazardous work management techniques are considered: (1) on site-processing; (2) off-site processing; and (3) on-site pretreatment with off-site treatment. The cost of on-site treatment and disposal of most hazardous materials is generally high because of high fixed or high labor costs. Off-site processing benefits from certain potential economies of scale and are generally performed by a majority of industrial hazardous waste proceducers. On-site treatment is attractive in two situations. Economics favors this approach for industrial explosives that are either off-standard or overaged and often considered dangerous to be transported. In several states transportation of such materials is illegal. Some waste categories, such as dilute solutions containing heavy material, will also be more economic to concentrate on-site. An exploration of legal and institutional factors indicates that few deal specifically with hazardous wastes although the area is continuing to evolve. With the exception of explosives, risk considerations have never changed a decision based on economic or legal factors. Whatever approach to managing hazardous waste is taken, the key must be flexibility as new materials are added to the list and greater understanding of the composition, form and qualities of such material occurs. (Schroeder-Wisconsin)
W75-02629

PUMPS FOR SEWAGE TREATMENT PROCESSES,
For primary bibliographic entry see Field 8C.
W75-02695

PLANNING AND CONTROL OF COMBINED SEWERAGE SYSTEMS,
San Francisco City and County Dept. of Public Works, Calif.
For primary bibliographic entry see Field 6A.
W75-02697

SUBMERSIBLE PUMPS IN THE SEWAGE SYSTEM,
Royal Inst. of Tech., Stockholm (Sweden).
For primary bibliographic entry see Field 8C.
W75-02698

NITROGEN MOVEMENT RESULTING FROM SURFACE APPLICATION OF LIQUID SEWAGE SLUDGE,
Georgia Agricultural Experimental Station, Athens.
For primary bibliographic entry see Field 5B.
W75-02701

SEWAGE TREATMENT SLUDGE CONCENTRATING PLANT--WITH IMPROVED HEAT RECOVERY FROM TREATED CONCENTRATE TO INCOMING RAW SLUDGE.
For primary bibliographic entry see Field 5D.
W75-02702

THE DUAL FUNCTIONING SWIRL COMBINED SEWER OVERFLOW REGULATOR/CONCENTRATOR,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W75-02706

PREPARATION OF HAIR FOR LEAD ANALYSIS,
Vanderbilt Univ., Nashville, Tenn. Dept. of Chemistry.
A. N. Clarke, and D. J. Wilson.
Archives of Environmental Health, Vol 28, No 5, p 292-296, May, 1974. 5 tab, 2 fig, 19 ref.

Descriptors: *Laboratory tests, *Lead, *Cleaning, *Detergents, Analytical techniques, Spectroscopy, Human physiology, Sampling, Pollutants.
Identifiers: *Sample preparation, Washing procedures, Surface lead contamination, Contaminants, *Pollutant removal, EDTA.

A comparison of the washing procedures for hair samples for lead analyses was made. The three major categories of hair washing procedures reported were: (1) an ether (hot) washing procedure; (2) a detergent (plus organic solvent, in some cases) washing procedure, and (3) an ethylenediaminetetraacetic acid (EDTA) procedure. The three methods were compared for their relative efficacy in the removal of both naturally occurring and dosed surface lead contamination on specimens from the same hair sources. The EDTA washing procedure proved best to eliminate the surface lead contamination of hair. Absorption of surface-bound lead into the hair shaft was not observed. (Jernigan-Vanderbilt)
W75-02723

PROCESS FOR REMOVING MOLYBDENUM FROM AQUEOUS INDUSTRIAL EFFLUENTS AND FOR REDUCING THE LEVEL OF AVAILABLE MOLYBDENUM IN SOILS IN AREAS OF MOLYBDENUM TOXICITY,
Colorado Univ., Boulder.
For primary bibliographic entry see Field 5D.
W75-02739

5F. Water Treatment and Quality Alteration

WATER TREATMENT: HOW TO TOP EVEN GOVERNMENT STANDARDS,
Holley, Kenney, Schott, Inc., Pittsburgh, Pa.
For primary bibliographic entry see Field 5D.
W75-02204

ROYAL SEND-OFF FOR SEVERN SCHEME.
Surveyor, Vol 142, No 4245, p 30-31, October 19, 1973. 5 fig.

Descriptors: Water resources development, *Water storage, *Pumping plants, Future planning(Projected), Water works, Treatment facilities, Equipment, Europe, *Pumped storage, Reservoirs, *Water treatment.
Identifiers: *United Kingdom(Severn River).

The Severn Scheme is the largest undertaken by the Bristol Waterworks Company of England since its formation, and when completed will yield a total of 61 mgd. For phase I of the sheme, four vertical-spindle pumping units were installed which deliver water from the treated-water reservoir to the new Puckelchurch reservoir through a 46-inch diameter steel trunk main. Surge protection is by means of a conventional small surge vessel at the pumping station and an atmospheric feed tank at the highest intermediate point of the main. Phase II of the scheme will supply an extra 12 mgd bringing the combined Purton throughput to 61 mgd. (Sandoski-FIRL)
W75-02209

A CHARACTERIZATION OF RADIOACTIVE CONTAMINATION OF THE VISTULA RIVER, (IN POLISH),
Polish Association of Sanitary Engineering and Technology, Warsaw.
For primary bibliographic entry see Field 5B.
W75-02582

THE USE OF COAGULATION AND FILTRATION IN RADIO-CONTAMINATED WATER TREATMENT, (IN POLISH),
Polish Association of Sanitary Engineering and Technology, Warsaw.
J. Kwapulinski, and R. Danecka-Palasz.
Gaz Woda Tech Sanit. 47(3): 92-94, Illus. 1973.

Descriptors: *Radioisotopes, *Coagulation, *Filtration, Poland.
Identifiers: Deactivation filter process.

Radioactive substances are found in waters in both soluble and nonsoluble forms, and are capable of forming radio-colloids. Several methods for deactivation of radio-contaminated waters are known, the coagulation and filtration methods being universally used in Poland. Both the filtration and coagulation methods are described. In cases of highly contaminated water, the filtration process should be used immediately after coagulation. The deactivation filter process is based on retention of radioactive suspensions by a biological membrane.--Copyright 1974, Biological Abstracts, Inc.
W75-02583

THE PRESENT STATE OF KNOWLEDGE ON FLUORIDATION OF POTABLE WATER IN POLAND, (IN POLISH),
Polish Association of Sanitary Engineering and Technology, Warsaw.
J. Chrusciel.
Gaz Woda Tech Sanit. 47(9): 290-293, Illus. 1973.

Descriptors: *Potable water, Poland, *Fluoridation.

Studies on the F content in Polish waters showed that in general there is a deficiency of this element, and fluoridation is therefore essential for prophylatic purposes. One problem which has not yet been practically solved is that of maintaining a constant F concentration. Existing installations can only maintain F content in potable water at a lower level than optimal. Increasing F concentration to the required optimal level of 1.0 mg/l necessitates improvements in these installations. The present trend is to introduce fluoridation throughout the country, even at the lower level possible in present conditions.--Copyright 1974, Biological Abstracts, Inc.
W75-02584

FOUR YEARS OF TAP WATER FLUORIDATION IN KOLOBRZEG, (IN POLISH),
District Sanitary-Epidemiological Station, Kolobrzeg (Poland).
E. Drzewiecki.
Gaz Woda Tech Sanit. 47(5): 166-168, Illus. 1973.

Descriptors: *Potable water, Poland, *Fluoridation.
Identifiers: Kolobrzeg.

In Poland both ground water and surface waters are sources of tap water for the populace. Both types are deficient in F as required by sanitary norms. F is one of the more important microelements in human metabolism. The technical conditions, methods of operation, and problems connected with the work of the fluoridation station in Kolobrzeg (Poland) including its sanitary control, after 4 yr of operation are described. F is added in the form of Na2SiF6, a cheap by-product of the commercial fertilizer industry. A diagram of how the station operates is presented. The method used does not change the taste, odor or color of the water, and has been fully satisfactory.--Copyright 1974, Biological Abstracts, Inc.
W75-02585

REMOVAL OF NITRATES FROM POTABLE WATER BY ION EXCHANGE,
Negev Inst. for Arid Zone Research, Beersheba (Israel).
E. Korngold.
Water Air Soil Pollut. 2(1): 15-22, Illus. 1973.

Descriptors: *Ion exchange, Separation techniques, Water treatment, *Anion exchange, *Potable water, Nitrates, Chlorides, Analytical techniques.
Identifiers: Denitrification.

The feasibility of removing nitrates from otherwise potable water by means of anion exchange was investigated. Candidate anion exchange resins had to demonstrate a higher affinity for nitrate ions than for the other ions present (Cl-, HCO3-). The distribution factor between chloride and nitrate was investigated with the anion exchange resin Amberlite-400. In studies of column operation sea water was as effective as NaCl for regeneration. The nitrate ion capacity was proportional to the nitrate ion concentration and to the TDS (total dissolved solids) in the feed. Nitrate ion leakage was greater with lower levels of regeneration. An operational capacity for nitrate of 0.3-0.4 me (meq) ml-1 was found; this capacity was not significantly affected by the presence of sulfate ion in low concentration (2 me l-1).--Copyright 1974, Biological Abstracts, Inc.
W75-02595

LEAST-COST DESIGN OF WATER DISTRIBUTION SYSTEMS,
Western Australia Univ., Nedlands. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W75-02619

ECONOMICS OF FEEDWATER TREATMENT BY REVERSE OSMOSIS,
N. E. Dupee.
Industrial Water Engineering, p 36-39, May/June 1973.

Descriptors: *Waste water treatment, *Reverse osmosis, Cost analysis, Sanitary engineering.

Costs of feedwater treatment through reverse osmosis are explored. Reverse osmosis accomplishes the separation of dissolved solids by conduction of feedwater under pressure across a semi-permeable membrane. The process splits the feedwater into two fractions: a purified portion called permeate, or product water, and a smaller portion called the concentrate which contains most of the impurities. The effectiveness of the membrane to remove dissolved solids depends on several factors including type and form of solids, type of membrane, pressure, and pH. A reverse osmosis system usually consists of six elements: (1) pretreatment hardware; (2) high pressure pumps and associated motor; (3) pressure vessels which contour the membrane; (4) necessary valves and piping; (5) gages and instruments; and (6) cleaning equipment. Fundamental cost elements involved in reverse osmosis systems include feedwater cost, sewage cost, capital equipment, pretreatment, electricity, operating and maintenance labor, and membrane replacement. The total of the various operating costs for a reverse osmosis system is about 30 cents/1000 gal. which is comparable to the operating costs for an ion exchange system treating a feedwater containing 100 ppm TDS. A number of aspects of each cost component are discussed. (Schroeder-Wisconsin)
W75-02642

LEAST COST DESIGN OF WATER MAIN SYSTEM IN SERIES,
University Coll., London (England).
For primary bibliographic entry see Field 8A.
W75-02651

DRINKING WATER TREATMENT PLANT.
French Patent FR 2200-202. Issued April 19, 1974.
Derwent French Patents Abstracts, Vol 5, No 25, p 3, July, 1974.

Descriptors: *Patents, *Water treatment, *Potable water, Equipment, Chlorine, Pipes, Europe, Activated carbon, *Water purification, Europe, Carbon.
Identifiers: Treatment plants, France.

A compact, economically maintained water treatment is particularly useful in domestic situations. The unit consists of a housing with a detachable lid, containing a first set of columns filled with activated carbon. These absorb excess chlorine; the water inlet is fed there at the base, followed in the purification circuit by a detachable container of regeneration agent for the ion exchanger resin. This fills a second set of columns, again bottom fed, and from whose top the softened water of improved taste is fed to the outlet pipe. Interconnections between the internal elements are by flexible hoses and the sets of columns are retained by elastic straps. (Prague-FIRL)
W75-02691

HANDLING, PREPARATION, AND APPLICATION OF POLYELECTROLYTES,
For primary bibliographic entry see Field 5D.
W75-02700

THE DUAL FUNCTIONING SWIRL COMBINED SEWER OVERFLOW REGULATOR/CONCENTRATOR,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W75-02706

THE PREPARATION AND OXIDATION PROPERTIES OF FERRATE ION (FE04 2-). STUDIES DIRECTED TOWARDS ITS USE AS A WATER PURIFYING AGENT, PHASE I,
Missouri Univ., Columbia. Dept. of Chemistry.
For primary bibliographic entry see Field 5D.
W75-02707

PURIFIER DEVICE,
N. Sama.
United States Patent 3,815,753. Issued June 11, 1974. Official Gazette of the United States Patent Office, Vol 923, No 2, p 550-551, June 1974. 1 fig.

Descriptors: *Patents, *Water purification, Equipment, Filtering, Pumping, Liquids, Flow, *Waste water treatment, *Water treatment.
Identifiers: *Activated charcoal.

A liquid purifier device for immersion in a body of liquid includes an annular canister with a through central column or main duct. The canister has inlet and outlet means in spaced relation so that there is a flow path through the canister interior or secondary duct. A purifying medium is located in this flow path. When submerged, all of the inlet means are at a higher pressure level than the exit means. Thus, whenever a flow of air is introduced into the lower end of the column, a pressure differential is created. A tube is provided to introduce a flow of air into the lower end of the column when it is submerged so that the differential of pressure created in the column acts as a lift tube pumping means to cause a flow through the purifying medium. The purifying medium preferred is activated charcoal. The canisters may also be adapted for stacking and use in combination with a filtering device. (Prague-FIRL)
W75-02718

HEAVY METAL REMOVAL WITH STARCH XANTHATE-CATIONIC POLYMER COMPLEX,
Agricultural Research Service, Peoria, Ill. Cereal Products Lab.
For primary bibliographic entry see Field 5D.
W75-02732

5G. Water Quality Control

PHOSPHATE REMOVAL BY ALGAL SYSTEMS,
New Mexico Univ., Albuquerque. Dept. of Chemistry.
N. E. Vanderborgh, and A. G. Buyers.
Journal Water Pollution Control Federation, Vol 46, No 4, p 726-734, April, 1974. 7 fig, 1 tab, 23 ref.

Descriptors: *Algae, Surface waters, *Water pollution control, Phosphorus, *Phosphates, *Chemical wastes, Effluents, Nutrients, Acidity, Temperature, Soil water, Nutrient removal, *Hydrogen ion concentration, *New Mexico.
Identifiers: *Phosphorus removal, Pyrophosphates, Orthophosphates, *Rio Grande Valley(N Mex).

Growth of algae in surface waters is a visible type of pollution. Currently, several cities are removing phosphates chemically from their waste water effluents, a costly process. The question has been raised as to whether phosphorus is the rate-limiting step in algal growth. The Rio Grande Valley of New Mexico has both excessive nutrient concentrations and excessive sunlight, two conditions which are known to stimulate algal growth. The experiment consisted of examining the rate of 32P removal from solutions of filtered, aqueous sodium pyrophosphate under controlled conditions of acidity, temperature, luminant flux, and nutrients. Final data for removal were taken by subtracting the decay curve from each of the experimental plots. Results suggest that two mechanisms influence the rate of radioactive phosphorus (sodium pyrophosphate) removal from chlorella cultures in soil-water and chemical media. Also, the rate-limiting step for the removal can be interchanged by a variation in pH. The removal rate increases and changes order as acidity is increased. The inference is that orthophosphate exchanges, not pyrophosphate or phosphorus, and the hydrolysis rate are the rate determiners of the exchange process at elevated pH values. A very rapid removal of phosphorus under CO2 enriched conditions suggests interesting strategies for removal of phosphorus from surface waters. (Prague-FIRL)
W75-02208

ROYAL SEND-OFF FOR SEVERN SCHEME.
For primary bibliographic entry see Field 5F.
W75-02209

LEGISLATION CONTROLLING WASTE DISPOSAL,
Essex River Authority (England).
K. Guiver, and D. A. Gray.
The Public Health Engineer, No 8, p 45-50, March, 1974. 16 ref. Paper read at a Regional meeting of the Engineering Group of the Geological Society of London, on 'The Engineering Geology of Reclamation and Redevelopment' held at Durham, 10-13th September, 1973.

Descriptors: *Legislation, *Waste disposal, Landfills, Deep wells, Injection, Industrial wastes, Groundwater, Water pollution sources, Public health, Toxicity, Europe, *Water pollution, *Water pollution control, Water quality control, Environmental control.

Current legislative action controlling deposits to landfills and deep well injections is considered and the case for amendment examined. (Sandoski-FIRL)
W75-02215

SOURCE CONTROL KEY TO WASTE SYSTEM,
For primary bibliographic entry see Field 5D.
W75-02218

SHORTAGES: WATER POLLUTION CONTROL FACILITIES FACE THE CRISIS,
For primary bibliographic entry see Field 5D.
W75-02222

WATER POLLUTION SAMPLING, MONITORING AND ANALYSIS INSTRUMENTATION,
Newark Coll. of Engineering, N.J. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5A.
W75-02228

DETERMINATION OF THE BREAK-THROUGH VOLUME OF SODIUM CHLORIDE FOR SOIL COLUMNS IN PESTICIDE LEACHING,
Uniroyal, Inc., Naugatuck, Conn. Agricultural Chemicals Research and Development.
For primary bibliographic entry see Field 5B.
W75-02230

MAKING POLLUTION CONTROL EASIER: PART 2 - WATER TREATMENT AND CONTROL,
General Electric Co., Schenectady, N.Y. Environmental Protection Operation.
For primary bibliographic entry see Field 5D.
W75-02233

ENVIRONMENTAL ENGINEERING GLOSSARY.
Calspan Corp., Buffalo, N.Y.
For primary bibliographic entry see Field 6G.
W75-02240

MANURE AND WASTE PROJECTS ON DAIRY FARMS,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-02241

PERFORMANCE OF FEEDLOT RUNOFF CONTROL SYSTEMS IN MINNESOTA,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-02274

SUPREME COURT UPHOLDS JUDGEMENTS IN HBI CASE,
L. Harper.
Missouri Ruralist, p 12, January 23, 1971.

Descriptors: *Air pollution, *Legal aspects, *Odor, *Water pollution, *Confinement pens, Hogs.
Identifiers: *Supreme court, Judgement, Plaintiffs.

Reported are the results of a long term legal battle between Hog Builders Inc. and Glen and Doris Bower and Frank and Minnie Bower. The suit was filed in 1969 by the Bowers who contended that HBI had been negligent in their pollution control, had devalued the Bowers' land, and had impaired their living. The suit was heard by a jury and the jury found HBI guilty of both actual and punitive damages. The Bowers were awarded $136,200 by the jury. The case was then appealed to the Missouri Supreme Court, but the court held with the jury. HBI awarded the Bowers $136,200 and sold the hogs. The facilities were empty for several months until HBI sold the land. This case has caused many feeders to take extra precautions, and it is hoped that this case does not lead to many more lawsuits. (Russell-East Central)
W75-02275

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT. VOLUME II. WATER QUALITY DETERMINATIONS,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 5C.
W75-02283

ECONOMIC IMPACTS OF APPLYING SELECTED POLLUTION CONTROL MEASURES ON MICHIGAN DAIRY FARMS,
Michigan State Univ., East Lansing.
D. L. Good, C. R. Hoglund, L. J. Connor, and J. B. Johnson.
Michigan State University Agricultural Experiment Station Research Report 225, November, 1973. 12 p, 12 tab, 12 ref.

Descriptors: *Economics, *Dairy industry, *Michigan, *Agricultural runoff, Waste storage, Waste disposal, Labor, Dikes, Feed lots, Costs, Investment.
Identifiers: *Pollution control, Subsurface disposal, Soil injection, Stanchion housing, Open lot housing, Cold covered housing, Warm enclosed housing.

The economic impact of three selected control measures was analyzed. The control measures were: (1) mandatory control of surface runoff from the production site; (2) prohibition of winter spreading of dairy wastes; and (3) mandatory subsurface disposal of dairy wastes. The net effect of the labor required for the entire year for application of these pollution control measures would be the reduction of the total annual hours of labor needed for the adjusted systems. Results from using facilities to control surface runoff indicate that production costs would be elevated. Also compliance with the no winter spreading and subsurface disposal of wastes would again elevate production costs. The effect of complying with all three pollution control measures would increase costs by twenty-eight dollars per cow on a 40-cow dairy farm, but would be less severe on larger operations. (Russell-East Central)
W75-02302

CONTROL OF LARVAE OF THE HOUSEFLY AND THE HORN FLY IN MANURE OF INSECTICIDE-FED CATTLE,
Agricultural Research Service, Kerrville, Tex. Entomology Research Div.
For primary bibliographic entry see Field 5D.
W75-02313

SOLID STATE CONTROLS FOR ENVIRONMENTAL CHAMBERS,
Arkansas Univ., Fayetteville. Dept. of Agricultural Engineering.
T. R. C. Rokeby, G. S. Nelson, and G. C. Harris, Jr.
Paper No 72-418, presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972. 11 p, 9 fig.

Descriptors: *Poultry, *Performance, *Environmental control, Temperature, Air circulation, Growth rates, *Central systems, Farm wastes, Potable water, Waste treatment.
Identifiers: *Solid state controls, Environmental chambers, Feed conversion.

Temperature, air flow and drinking water temperature were regulated in order to examine the effects on poultry performance. Chamber design criteria included the following. Dry bulb temperature ranged from 35F to 105F. Wet bulb temperature ranged from 35F to 96F. Air movement didn't exceed 300 fpm at the floor level. Air exchange was fixed at 300 cfm. Chamber size was 8 ft by 12 ft by 7 ft. Chamber ambient conditions were 80F maximum dry-bulb. Temperatures ranged from 69F maximum wet bulb summer to 70F dry bulb minimum in the winter. Drinking water temperature was controlled. Different initial brooding temperatures, different rates of temperature decline with age, and different water temperatures were investigated. Analysis of results was incomplete but indicated that growth and feed conversion were best with initial brooding temperatures of 89F (32C), and that cooling the drinking water could aid the chicken to adapt to higher ambient temperatures. (Lee-East Central)
W75-02318

POULTRY WASTE MANAGEMENT ALTERNATIVES,
North Carolina Agricultural Extension Service, Raleigh.
For primary bibliographic entry see Field 5D.
W75-02334

BROILER LITTER SILAGE FOR FATTENING BEEF ANIMALS,
Texas A and M Univ., College Station. Dept. of Poultry Science.
For primary bibliographic entry see Field 5D.
W75-02336

CONTROL OF FLIES AROUND FEEDLOTS,
B. C. Clymer.
In: Texas A and M University, Texas Agricultural Extension Service, College Station, Great Plains Cattle Feeding Handbook, L-1100, p 7802.1-7802.2, March, 1973. 2 fig.

Descriptors: *Feedlots, *Farm wastes, *Larvicides, *Chemcontrol, *Insecticides, Drainage, Sprinkling, *Waste treatment.
Identifiers: Flies, *Fly control, *Waste management.

Control of common houseflies around feedlots is a problem. Effective housefly control requires proper animal waste management and good feedlot sanitation. Feedlots should be designed to allow proper drainage areas and prevent areas of waste accumulation. The best means of control is preventation of fly breeding areas. Pen drainage should be such that wet spots are avoided. Manure and spilled feed should be removed from fly breeding areas. Chemical control should be used in conjunction with proper waste management techniques and not as the sole means of control. Larvicides should be applied to areas of intense larval development, whereas residual and space sprays should be used to control adult flies. If sprinkling is used to relieve cattle heat stress or to control dust, efforts should be made to make sure sprinkler heads do not leak. The control and prevention of flies is not easy. But good management of pen areas and of waste control help alleviate the problem. (Russell-East Central)
W75-02337

IOWA WATER POLLUTION CONTROL COMMISSION,
Iowa State Dept. of Health, Des Moines.
U. Agena.
1971. 13 p, 5 tab.

Descriptors: *Water pollution control, *Air pollution, Odor, Pollutants, Livestock, Poultry, Confinement pens, *Regulation, *Iowa, Permits, Waste disposal, Agricultural runoff.
Identifiers: Confinement feeding.

Iowa has established separate agencies to deal with air and water pollution. The Iowa Air Pollution Control Commission has authority to regulate air pollutants, including odorous substances. Its activities are presently concentrated on establishing and enforcing regulations to control air pollutants felt to have public health implications. The Iowa Water Pollution Control Commission was established to prevent, abate, and control water pollution. Increased attention is now being given to control of pollution caused by livestock and poultry operations. Copies of the existing Iowa Water Pollution Control Commission cattle feedlot regulations and the proposed regulations for other animal feeding operations are attached. The regulations are divided into two major types of operations, open feedlot and confinement feeding operations. These are defined and regulations are given in detail for both. (Cartmell-East Central)
W75-02341

CONTROL OF BOD UPSETS IN THE DELAWARE ESTUARY,
Delaware Univ., Newark. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W75-02347

THE FATE OF FERTILIZER NUTRIENTS AS RELATED TO WATER QUALITY IN THE NORTH CAROLINA COASTAL PLAIN,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-02352

EVALUATION OF LARGE-SCALE MECHANICAL MANAGEMENT OF AQUATIC PLANTS IN WATERS OF DANE COUNTY, WISCONSIN,
Wisconsin Univ., Madison. Dept. of Mechanical Engineering; and Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
R. G. Koegel, D. F. Livermore, and H. D. Bruhn.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-238 031, $3.75 in paper copy, $2.25 in microfiche. Technical Report, Wisconsin Water Resources Center, Madison, October 1974. 37 p, 11 fig, 6 tab. OWRT A-050-WIS(1), NSF/RANN GI 39193. 14-31-0001-3850, 14-31-0001-4050, NSF/RANN GI 39193.

Descriptors: Aquatic plants, *Rooted aquatic plants, *Aquatic weed control, *Biomass, *Water harvesting, *Productivity, *Costs, *Dissolved oxygen, *Wisconsin, Harvesting of algae, Lakes, Management.
Identifiers: Lake Monona(Wisc), Lake Kegonsa(Wisc), Lake Waubesa(Wisc), Lake Mendota(Wisc), *Aquatic plant harvesters, Dane County(Wisc).

Productivity and costs of two aquatic vegetation harvesters operated by Dane County, Wisconsin, were studied. Data were gathered during one operating season under actual operating conditions. In addition, records kept by Dane County personnel were made available to the study. Using this information, productivity costs were calculated on a per acre and per hour basis. Both machine time and harvesting costs were subdivided into various categories to allow identification of those categories with the most potential for improvement. Dissolved oxygen levels in harvested and non-harvested areas were compared on a diurnal basis.
W75-02354

SUPPORT SYSTEMS TO DELIVER AND MAINTAIN OIL RECOVERY SYSTEMS AND DISPOSE OF RECOVERED OIL,
Battelle Columbus Lab., Ohio.
B. C. Kim, H. Carlton, T. J. Cooke, J. H. Hancock, and R. A. Mendelsohn.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-778 941, $8.50 in paper copy, $2.25 in microfiche. Report No CG-D-56-74, January 7, 1974. 237 p, 21 fig, 49 tab, 58 ref, 3 append. DOT-CG-23223-A.

Descriptors: *Oil spills, *Waste disposal, Oil pollution, Oily water, Disasters, Ultimate disposal, Oil, Water pollution sources, Ships, Oceans, Land fills, Recycling, Incineration, Transporation, Distribution, Forecasting.
Identifiers: *Oil spill recovery, *Transfer systems, *Support vessels, *Oil transport traffic density, Oil refineries, Refineries.

Research and development activity within the U.S. Coast Guard is concerned with both prevention and control of pollution related to maritime transportation. Technical problems that need to be resolved and the areas of technology that need to be improved to accomplish the spill recovery process in an efficient and expedient manner were discussed. Methods of ultimate disposal of oil from sea spills were examined. Recommendations were made as to the best methods of disposal of several types and sizes of oil spills. Forecasts of oil tanker traffic on the High Seas and particularly the United States coastal waters were made for the years 1975, 1980, 1985, and 1990 to establish future requirements for oil cleanup systems and their most suitable locations. (Humphreys-ISWS)
W75-02374

LIGHT TRANSMISSIVITY, SUSPENDED SEDIMENTS AND THE LEGAL DEFINITION OF TURBIDITY,
University of South Florida, St. Petersburg. Marine Science Inst.
For primary bibliographic entry see Field 5A.
W75-02389

WHAT TO DO ABOUT POULTRY'S PROTEIN-ENERGY CRISIS,
Georgia Univ., Athens. Dept. of Poultry Science.
L. S. Jensen.
Poultry Digest, Vol 32, No 381, p 489-492, November, 1973. 1 fig.

Descriptors: *Poultry, *Proteins, *Energy, Amino acids, Feeds, Diets, Recycling, Management.
Identifiers: Antibiotics, Fats, Calories.

It may be necessary to develop new sources of nutrients, use existing sources more efficiently and make some changes in management to offset the increasing costs of feeds. The following are means of improving nutritional formulation of poultry rations: (1) Reduce protein levels, (2) Use synthetic amino acids, (3) Improve feed quality control, (4) Consider extra caloric effect of fat, (5) Use effective antibiotics for growth stimulation, (6) Consider protein or amino acid sparing factors. Limiting feeding, controlling feed wastage, and identifying factors causing variations in the performance among contract growers should also bring about better utilization of expensive broiler feed. (Ballard-East Central)
W75-02439

AUSTRALIAN WATER QUALITY: PROBLEMS AND POLICY,
Caulfield Inst. of Tech. (Australia).
B. T. Hart.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 319-335, 4 fig, 1 tab, 9 ref.

Descriptors: *Water resources, *Water quality, *Groundwater, *Surface waters, *Australia, Water quality standards, Sewage, Salinity, Industrial wastes, Water pollution, Environmental control, Climate, Irrigation, Hydroelectric power, Water supply, Arid climates, Semiarid climates, Management.

Australia is a developed and industrialized country with a unique environment that has a marked influence on the quantity and quality of its water resources. In addition Australia has a Federal/State governmental system where the major expertise and legislative powers in the water field lie with the states. During 1970, Australia witnessed two events of significance to the water quality field. First, the Senate Select Committee on Water Pollution published their report 'Water Pollution in Australia' pointing out the problem areas in Australia and focusing nationwide attention on water pollution. Second, wide-range environmental legislation was introduced by several states in an attempt to halt the tide of environmental deterioration. The major water quality problems confronting Australian water quality management (sewage, salinity, and industrial wastes) were discussed together with recently introduced measures to counter these problems. Current water quality research and investigation being conducted were also discussed. (See also W75-02440) (Dawes-ISWS)
W75-02458

NATIONAL REPORT ON THE STATUS OF CANADIAN WATER RESOURCES ACTIVITIES AND DEVELOPMENT,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2A.
W75-02468

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT,
National Pollution Control Commission, Manila (Philippines).
For primary bibliographic entry see Field 6B.
W75-02470

THEORETICAL MODELING INVESTIGATION FOR SELF-PURIFICATION OF RIVERS (MODELLTHEORETISCHE UNTERSUCHUNGEN IUR SELBSTREINIGUNG VON FLIESS GEWASSERN),
Kernforschungszentrum, Karlsruhe (West Germany). Institut fur Angewandte Systemtechnik und Reaktorphysick.
For primary bibliographic entry see Field 5C.
W75-02505

ENVIRONMENTAL CONTROL,
K. L. Clifford.
Mining Engineering, Vol 25, No 2, p 83-85, February, 1973.

Descriptors: *Reviews, *Industries, *Water reuse, *Pollution abatement, Recycling, Byproducts, Water pollution control, Sulfur compounds, Metals, Mining, Costs, Federal jurisdiction.

Over the period 1972-1980 pollution control facilities will cost $26 billion according to economic impact studies performed under the direction of United States Government agencies. The top priority problem for 1972 was the control of sulfur dioxide. Hydrometallurgical approaches to pollution abatement included chloride leaching with subsequent control of waste water effluents indicating an increased recycling in mining and milling. Water reclamation in the mining industry also has shown promise for future pollution abatement as well as being the keystone to byproduct marketing. (Sandoski-FIRL)
W75-02553

FOOL'S GOLD POLLUTES,
West Virginia Univ., Morgantown.
For primary bibliographic entry see Field 5B.
W75-02556

OTTAWA SETS TIMETABLE FOR CLEANUP.
Canadian Chemical Processing, Vol 58, No 3, p 19-21, March, 1974. 4 tab.

Descriptors: *Water pollution control, *Water quality standards, *Canada, *Environmental control, Legislation, Governments, Air pollution, Effluents, Chemicals, Public health.

Public Control over pollution in Canada is being achieved via a two-level system. The Federal government is enacting legislation that sets acceptable levels of air and water quality while each province sets and enforces specific pollution control measures covering processing plants within its borders. Ottawa gave its first priority to control of water pollution under the Clean Water Act since health and food were so clearly involved. Air pollution control objectives and standards were then initiated. Water quality standards, chemicals limitations, and industrial effluents program schedules are tabated. (Sandoski-FIRL)
W75-02557

THE MOVEMENT OF EFFLUENT FROM THE CITY OF MIAMI SEWAGE OCEAN OUTFALL,
Miami Univ., Fla. Sea Grant Institutional Program.
For primary bibliographic entry see Field 5E.
W75-02559

OPEN DAY CONDUCTED BY CONTROL EQUIPMENT COMPANY.
For primary bibliographic entry see Field 5D.
W75-02560

'RESTORE OR MAINTAIN': A REVIEW OF WATER QUALITY IN DEVON,
D. Mugford.
The Public Health Engineer, No 8, p 57-61, March, 1974. 3 tab. Paper presented at Institution of Public Health Engineers, Southwestern District Center (Great Britain).

Descriptors: *Reviews, *Water resources, Rivers, Water pollution control, *Water quality, Analytical techniques, On-site tests, Biodegradation, Effluents, Industrial wastes, Mine wastes.
Identifiers: Great Britain, Devon River Authority.

The area administered by the Devon River Authority covers some 625,810 hectares and can be described as predominantly agricultural with an

inland population being well distributed. In general the rivers of Devon are clean with most of the effluents being transient in effect and pollution not often severe. It is a general characteristic of the Devon rivers because of their natural reaeration and self-cleansing properties, to deal effectively and quickly with biodegradable wastes. There are, however, a few lengths where the quality of water is unsatisfactory either because of poor quality discharges from overloaded or inadequate sewage treatment or trade effluent works, or from natural pollution because of the peculiar characteristics of the area. In addition to the routine chemical analysis that provides the bulk of information on water quality, tests are constantly being carried out for a wide variety of toxic constituents of industrial and mine water discharges, and in connection with sporadic incidents of river pollution. (Sandoski-FIRL)
W75-02565

AN EXAMINATION OF THE SUCCESSFUL APPROACH TO WATER RESOURCES DEVELOPMENT IN THE SOUTH WEST,
For primary bibliographic entry see Field 6A.
W75-02566

2001 - A WATER ODYSSEY.
For primary bibliographic entry see Field 6A.
W75-02567

NEW CONCEPTS FOR DAIRY WASTE MANAGEMENT,
California Univ., Los Angeles. School of Public Health.
For primary bibliographic entry see Field 5D.
W75-02573

CHEMICAL COMPONENTS AND ESTIMATED DIGESTIBILITY OF DEHYDRATED CATTLE MANURE,
Bureau of Reclamation, Grand Junction, Colo.
For primary bibliographic entry see Field 5B.
W75-02574

DEVICE AND APPARATUS FOR TREATING LIQUIDS SUCH AS DRINKING WATER AND WASTE WATER,
For primary bibliographic entry see Field 5D.
W75-02576

SAMPLING DEVICE,
Kaiser Aluminum and Chemical Corp., Oakland, Calif.
For primary bibliographic entry see Field 5A.
W75-02577

PROBLEMATIC CONSIDERATIONS OF AQUATIC WEED CONTROL (ANALYSE DE LA PROBLEMATIQUE DU CONTROLE DE LA VEGETATION AQUATIQUE),
National Inst. of Scientific Research, Quebec.
For primary bibliographic entry see Field 2I.
W75-02578

HOUSING AND SHELTER FOR FEEDLOT CATTLE,
Minnesota Univ., St. Paul.
For primary bibliographic entry see Field 5E.
W75-02589

A FEEDLOT WITHOUT WASTE,
For primary bibliographic entry see Field 5D.
W75-02590

ENVIRONMENT PROTECTING CONCEPTS OF BEEF CATTLE FEEDLOT WASTES MANAGEMENT,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5D.
W75-02593

REMOVAL OF NITRATES FROM POTABLE WATER BY ION EXCHANGE,
Negev Inst. for Arid Zone Research, Beersheba (Israel).
For primary bibliographic entry see Field 5F.
W75-02595

THE SEWER MORATORIUM AS A TECHNIQUE OF GROWTH CONTROL AND ENVIRONMENTAL PROTECTION.
Rivkin/Carson, Inc., Washington, D.C.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-230 293, $3.75 in paper copy, $2.25 in microfiche. Report HUD-PDR-001 d, July 1973. 33 p, 12 tab, 8 ref. H-2095R.

Descriptors: *Control, *Human population, *Land development, *Sewerage, Zoning, Land use, Planning, District of Columbia, Maryland, Community development, Growth rates.
Identifiers: Montgomery County(MD), Sewer moratorium.

Sewer moratoriums have been increasingly employed in the Far West, South Florida, the North Central, and Middle Atlantic states as a new means of urban growth control. While some central cities employ moratoria, the technique has been used primarily within suburban and fringe portions of the metropolitan areas. Moratoriums arise for a number of reasons including inadequate treatment facilities, interruptions, and planned growth. The moratorium also takes several forms: freeze on new sewer authorization, on new sewer connections, on the issuance of new building permits, on the approval of subdivision requests, and/or in combination on rezoning. Limited results from a 1973 International City Management Association mail survey to 2282 cities (over 10,000) and 639 counties (over 50,000) indicate that 19 and 15, 16 and 9, 16 and 27, and 26 and 33% of city and county respondents in the Northeast, Northcentral, South, and West, respectively, have invoked moratoria. Respondents indicate multi-faceted approaches in implementing moratoria with delayed building permits, and connection of water and sewer lines being the most frequent result. Results of a 1973 HUD survey indicate similar results. Case studies of moratoria in Montgomery County, Maryland and the Washington Metropoliton Area are presented. (Schroeder-Wisconsin)
W75-02617

ASSESSING THE INTANGIBLES IN WATER POLLUTION CONTROL,
Sussex Univ., Brighton (England).
P. K. Marstrand.
International Journal of Environmental Studies, Vol 5, No 4, 1974, p. 289-298, 4 tab, 2 fig, 23 ref.

Descriptors: *Intangible benefits, *Water quality control, Pollution abatement, Measurement.
Identifiers: Wye River, Erewash River(England).

Three methods to measure intangible benefits arising from pollution control are delineated. The first method assumes that if the amount presently being expended on abatement is optimal then the benefits just equal the costs less material damages. The second approach requires data on the costs imposed on users of water before and after an abatement program is implemented. At an optimum, the expenditures to reduce pollution, or the reduction in costs would be approximate. A third approach based on the health of the water is also explored. The approach uses a biological assessment as a proxy for intangible benefits. Three systems of biological assessment developed by Woodiwiss, Graham and Chandler are illustrated utilizing data on the Wye River at High Wycombe, in the jurisdiction of the Thames Conservancy and the Erewash, a tributory of the Trent in England. When information on expenditure is also available in addition to biological data, cost-effectiveness comparison of different programs can also be made. (Schroeder-Wisconsin)
W75-02657

FINANCING AND CHARGES FOR WASTEWATER SYSTEMS,
American Public Works Association, Chicago, Ill.; and Water Pollution Control Federation, Washington, D.C.
For primary bibliographic entry see Field 6C.
W75-02658

THE EFFECT OF LOW VOLUME AND HIGH VOLUME AERATION ON A HOG LAGOON,
North Dakota State Univ., Fargo. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-02668

WATER QUALITY CONSIDERATIONS IN THE DESIGN OF WATER RESOURCE SYSTEMS,
Water Resources Board, Reading (England).
C. Page, and A. E. Warn.
Water Research (G.B.), Vol 8, No 11, p 969-975, November 1974. 4 fig, 1 tab, 3 ref.

Descriptors: *Water quality, *Simulation analysis, *Research, *Projects, *Rivers, Constraints, Evaluation, Design, Chlorides, Nitrates, Water supply, Waste water(Pollution), Water demand, Mathematical models, Systems analysis, Water quantity.
Identifiers: Sensitivity, Operating rules, Historic data.

Simulation is shown to be a useful method of investigating the general quality of water supplied from a resource system. A means of evaluating the effect of quality constraints on the yield of the resource system is provided, and the relative effectiveness of different methods of reducing the concentrations entering the supply may be assessed. Modeling of quality characteristics can be adequate if due regard is given to the sensitivity of the results of the model to uncertainties which surround the input data. Described is a research project aimed at introducing water quality parameters into a quantity-only simulation model of the Welland and Nene River Authority. The model is a simple accounting procedure with built-in lags and attenuations. Two historic records were analyzed with two objectives: (1) to isolate the contributions to the levels of chloride and nitrate attributable to discharges of wastewater; and (2) to describe mathematically the fluctuations in the levels of river water quality arising from background sources, and hence generate synthetic water quality data for model input. Herein, some examples are given of the use of the model to examine the effect on chloride concentrations of altering the constraints and operating rules of the water resource system. In each case, the model was used to simulate 100 yrs of operation of the system for the projected demands of 2001. Considered herein are: the effect of recirculation; increase of minimum flow constraint; and alternate methods of supplying Peterborough. (Bell-Cornell)
W75-02683

TWO SECTION WATER CLARIFICATION COLUMN.
Netherlands Patent NL 7316-894. Issued June 17, 1974. Derwent Netherlands Patents Report, Vol 5, No 26, p 2, June, 1974.

Descriptors: *Patents, *Water purification, *Equipment.

Identifiers: Water clarification, Solids removal.

A water clarification device is comprised of a container delimiting a clarification chamber with a first section connected at its lower end to an adjacent second section, and a device for feeding the water to be clarified to the first section of the clarification chamber at a point above its lower end. In addition, devices remove solids and liquids from a space near the upper end of the first section of the chamber, and supply gas bubbles to the chamber between the water feed and the water discharge devices. A second section of the chamber is wider than the lower end of the first section. The corresponding part of the second section thus projects outward in the opposite direction to the lower end of the upper first section. (Prague-FIRL)
W75-02692

WATER PURIFICATION PLANT.
For primary bibliographic entry see Field 5D.
W75-02693

THE DUAL FUNCTIONING SWIRL COMBINED SEWER OVERFLOW REGULATOR/CONCENTRATOR,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W75-02706

SEPARATION OF IRON (III), COBALT (II) AND NICKEL (II) BY PAPER CHROMATOGRAPHY,
Nagpur Univ. (India). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-02733

HOW TO MINIMIZE POLLUTION FROM METAL PREFINISHING LINES,
Amchem Products, Inc., Ambler, Pa. Hydro-Fax Div.
For primary bibliographic entry see Field 5D.
W75-02738

STUDY OF THE ROLE OF SCIRPUS AMERICANUS PERS. IN DEPOLLUTING WATERS CONTAMINATED WITH HEAVY METALS, (IN FRENCH),
Laval Univ., Quebec. Departement de Biologie.
For primary bibliographic entry see Field 5C.
W75-02742

DETERGENTS IN SURFACE WATERS AND THE INFLUENCE THEREOF ON MALARIA MOSQUITOES; SPECIAL STUDY ON (THE ISLAND OF) WALCHEREN,
Amsterdam Univ. (Netherlands). Lab. of Parasitology.
For primary bibliographic entry see Field 5C.
W75-02745

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

ROYAL SEND-OFF FOR SEVERN SCHEME.
For primary bibliographic entry see Field 5F.
W75-02209

TRENDS IN HYDROLOGICAL ANALYSIS,
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 2A.
W75-02477

A WATER POLICY-LAND USE COMPUTER SIMULATION MODEL,
Missouri Univ., St. Louis. Dept. of Quantitative Management.
C. F. Meyer, and A. B. Corbeau.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 027, $7.25 in paper copy, $2.25 in microfiche. Completion Report, Missouri Water Resources Research Center, Columbia, June 30, 1974. 203 p, 3 fig, 5 tab, 299 ref, 5 append. OWRR B-088-MO(2). 14-31-0001-3904.

Descriptors: *Land use, Simulation analysis, Model studies, Planning, *Future planning(Projected), *Computer models, Urbanization, *Water policy, Management, Forecasting, *Missouri, *Regional analysis, Input-output analysis, Projections, *Water allocation(Policy).
Identifiers: *St Louis(Mo).

A simulation model has been prepared to study the effects of various resource management policies to provide land use forecasts for the St. Louis area. User control imput, and an economic data base of the region are used to generate information for industrial, residential, commercial and public application. Control input consisted of macro population forecasts by counties, desirability criteria and density and dispersion specifications. These are altered by hypothesized water management policies. The work provides examples that will provide flexibility for the user and easy modifications to adapt to other regions. The results should serve as a significant planning aid to local agencies.
W75-02507

NATIONAL ENVIRONMENTAL POLICY SHIFTS: A CASE FOR ENGINEERING MANPOWER PLANNING,
J. M. Snarponis.
Professional Engineer, Vol 44, No 5, p 29-31, May 1974. 1 fig.

Descriptors: *Manpower, *Employment opportunities, *Engineering personnel, *Human resources, Occupations, Professional personnel, *Resource allocation, Waste water treatment, Treatment facilities, *Planning, *Management, *Decision-making, Personnel management.
Identifiers: *Manpower planning.

Successful manpower planning systems relate predictors to manpower requirements as a basis for projections. Three types and levels of manpower planning for waste water treatment plants are discussed: national macro-manpower planning to determine the levels of economic growth necessary to achieve employment targets or to fill the human resource needs for meeting national goals; national manpower program planning for administration of programs designed to remedy the problem of special groups of persons; and, micro-manpower planning for the specialized needs of private business firms, employer associations, employee associations, and public agencies. (Sandoski-FIRL)
W75-02552

ENVIRONMENT UPDATE,
G. Siehl.
Library Journal, Vol 10, p 1357-1363, May 15, 1974.

Descriptors: *Reviews, *Environment, *Publications, Federal government, Oceans, Energys, Parks, Recreation facilities.

A review of environmental materials and developments in 1973 is presented with the following trends being of major importance. As a result of the energy situation in the United States, Congress approved the Alaska pipeline, authorized year-round daylight savings time, set maximum highway speed limits, approved the reconsolidation and expansion of energy research endangered species. Energy also headed the list of environmentally related issues with which the executive branch wax concerned during 1973. Books published in 1973 did not reflect the issues given most weight by government, the press, and the public; energy does not dominate the list of new titles available for review. Park, recreation, and wilderness books ranked highest in number. A number of books have continued the assessment of the degree to which the environment has been damaged and of the steps required to set things right again. Interest in the resources of the oceans has continued to grow while efforts to prevent additional pollution of these waters have struggled to keep pace. The energy situation and the desire to become energy sufficient have made the expected hydrocarbon resources of the continental shelf more attractive and newsworthy. (Sandoski-FIRL)
W75-02554

ENVIRONMENTAL POLICIES CALL FOR NEW PROFESSIONALISM IN ENGINEERING, SCIENCE,
For primary bibliographic entry see Field 6C.
W75-02555

AN EXAMINATION OF THE SUCCESSFUL APPROACH TO WATER RESOURCES DEVELOPMENT IN THE SOUTH WEST,
D. J. Dixon.
The Public Health Engineer, No 8, p 53-55, March, 1974. Paper presented at the Institution of Public Health Engineers, Southwestern District Centre. (Great Britain).

Descriptors: *Water resources development, Regional development, Optimum development plants, Projections, Comprehensive planning, Europe.
Identifiers: Great Britain.

This paper examines and explains the current approach in Devon to water resources development and gives an example of a recent success. (Sandoski-FIRL)
W75-02566

2001 - A WATER ODYSSEY.
Surveyor, Vol 143, No 4259, p 10-11, January, 1974.

Descriptors: *Water resources, *Water resources development, Project planning, Water quality, Water supply, Rivers, Artificial recharge, Potable water, Effluents, Environmental effects, Water storage, Ecology, Europe.
Identifiers: *Great Britain.

The Water Resources Board of England having recently completed a report on the water resources of England and Wales investigated both the short-term (until 1981) and long-term (until 2001) strategies. The full list of projects recommended for implementation and investigation are tabulated and shown schematically. Further recommended research and development includes large-scale artificial recharge, factors determining the quality of water in rivers constituting a possible source of supply, effluent discharges to potable waters, environmental and ecological problems associated with large inland and offshore storage sources, and river-to-river transfers. (Sandoski-FIRL)
W75-02567

REGIONAL STUDIES--LAKE MICHIGAN ENERGY FORECASTS THE ECONOMETRIC APPROACH TO ELECTRICITY SUPPLY AND DEMAND: REVIEW AND ANALYSIS,
Argonne National Lab., Ill.
J. G. Asbury.
Report ANL/ES-33, May 1974. 34 p, 7 fig, 7 tab, 22 ref. AEC W-31-109-Eng-38.

Descriptors: *Electric power demand, *Mathematical model, *Prices, Elasticity of demand, Elasticity of supply, Forecasting, Fuels, Electricity.

Assumptions, methodology, results, and extensions of several econometric studies of electric supply and demand relationships are presented. Several key relationships among market variables are first presented graphically: (1) price versus quantity: cross-sectional data; (2) price versus quantity: time series data; and (3) interfuel substitution. Models used in econometric studies generally fall into two categories: static models utilizing single equations or supply and demand equations; and dynamic models which account for technological advancement and changing consumer preferences. A summary of five studies utilizing these approaches indicated that electric price is the most important determinant of demand. Findings indicate that electric demand is price elastic and income inelastic. Application of a number of these approaches to a residential market confirms these earlier findings and suggests that interfuel competition plays a large role. Fuel price elasticity equaled 0.30 compared to electric price elasticity of 0.40. An analysis of 1959-70 supply and demand data indicates that electric price and consumption can be explained by a stable supply curve and an upward shifting demand curve. Increases in real electric supply costs is expected to limit this predicted relationship in the future. (Schroeder-Wisconsin)
W75-02610

A SENSITIVITY ANALYSIS OF SIMULATED RIVER BASIN PLANNING FOR CAPITAL BUDGETING DECISIONS,
Utah Univ., Salt Lake City. Div. of Business Administration.
G. R. Wells.
Army Engineer Institute for Water Resources, 1WR Paper 74-P1, March 1974. 121 p, 26 tab, 7 fig, 55 ref.

Descriptors: *Mathematical models, *Water management(Applied), Investment, Cost-benefit ratios, Hydrology, Planning, Oregon, Multi-purpose projects.
Identifiers: Capital budgeting, Operating procedures, Grande Ronde Basin(Ore).

The applicability of simulation techniques for capital budgeting is illustrated utilizing a proposed multiple objective project in Oregon's Grande Ronde Basin. A probable methodology is employed using hydrologic data for simulation of water flows and probability distributions for amounts of capital investment, annual operation and maintenance costs and benefits. Exogenous variables include: (1) hydrological data based on 41 years of historical data, (2) capital sets for three different sizes of two reservoirs, and (3) operating procedures as determined for three different scales of irrigation projects. Flood control and fisheries are identified. Endogenous variables include the net present benefit and benefit cost ratios arising from nine reservoir combinations and three operating procedures. Hypotheses of the study are concerned with changes in the controllable exogenous variables (capital sets and operating procedures) on the endogenous variables. Analysis of variance is applied to runs of each combination to determine whether significant differences exist. Results indicate some sets are superior to others with none superior. Analysis of variance at the 0.05 significant level indicates no significant differences among the upper three sets (highest net present benefits) reducing the decision set to three. (Schroeder-Wisconsin)
W75-02615

LEAST-COST DESIGN OF WATER DISTRIBUTION SYSTEMS,
Western Australia Univ., Nedlands. Dept. of Civil Engineering.
T. Watanatada.
Journal of Hydraulics Division, American Society of Civil Engineers, p 1497-1513, September 1974. 5 fig, 3 tab, 21 ref.

Descriptors: *Water delivery, *Economic efficiency, *Pipes, Water supply, Pipelines, Mathematical models, Optimum development plans.
Identifiers: *Least-cost.

A computer-based automatic design method is presented which, given a network configuration, simultaneously computes the least-cost pipe size and pumping capacities for a water distribution system subject to demand requirements. The approach treats the minimization problem as a nonlinear programming problem. Solutions for the problem are obtained through transformation of the constraint problem into an unconstrained one which can be solved utilizing available unconstrained minimization algorithms. In addition to determining the least-cost solution, the approach allows sensitivity analysis to be conducted to determine the effect of discount rates and design horizons on optimal pipe sizes and pumping processes; effects of changes in delivery pressure standard on costs; and sensitivity of the balance between cost of pumping, pumping equipment, and pipeline. Model and actual networks are presented to test the method. Results indicate that an optimal network does not change the minimum allowable delivery pressure, provided that the cost of supplying water at each source node varies linearly with supply pressure. Comparison with actual networks indicates that the approach produces significantly more economical results than the conventional design. (Schroeder-Wisconsin)
W75-02619

ECONOMIC PIPE SIZING FOR GRAVITY SPRINKLER SYSTEMS,
Stellenbosch Univ., (South Africa).
R. P. Perold.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, p 107-116, June 1974. 3 fig, 4 tab, 2 ref.

Descriptors: *Optimization, Water supply, Water management(Applied), *Water conveyance, *Pipelines, Gravity, Cost analysis, Mathematical models.

An approach to determine the least cost pipe sizes within segments of a gravity water system is described. In the procedure, a trial design is checked by evaluating the economy of changing pipe sizes in one part of the system while compensating for changes in other parts of the system. Calculations are made on the basis of a change in a unit in frictional head, e.g., 1 m. First, the length of pipe to be changed in order to produce a difference of 1 m. head is calculated and the resulting cost changes noted. The procedure is repeated for both reduction and enlargement in pipe sizes throughout all system segments. In the model, pairs of such changes are undertaken, subject to the condition that reduction in one segment can be compensated for by similar changes in the frictional head, until the least cost solution is found. Branching influence is also considered. (Schroeder-Wisconsin)
W75-02625

COASE EXTERNALITY THEORY IN A POLICY CONTEXT,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
A. Randall.
Natural Resources Journal, Vol 14, No 1, p 36-54, January 1974, 52 ref.

Descriptors: Economic impacts, Income distribution, Institutions, Legal aspects, Regulation, Social impact, Planning.
Identifiers: *Coase Theory.

Although much discussion has resulted from Coase's theorem originally developed in 'The Theory of Social Cost', sizable confusion has arisen as to whether opponents are arguing that the theory falters policy viewpoints, or vice-versa. This paper seeks to examine the development of Coasion externality theory, develop arguments against coasion theoretical results, and assess policy generalizations arising from the coasion theoretical results and their future application. Although many points of dissent over the coasion theory have arisen, two primary areas stand out. First, while Coase argued that the creation of externalities and associated liability rules should not be viewed morally, most recent commentators have noted that liability rules which do determine income distributions are valued ethical considerations. Secondly, early coasion claims that liability rules are allocatively neutral except in cases when income elasticity is zero, have been often refuted. While coasion theory was first viewed as a defender of laissez-faire, it may also be concluded that the policy implications of the theory would better support neo-Pigovion collective or public agencies to facilitate exchange between recipient and polluter. Such a system preserves many of the benefits of decentralized decision making. (Schroeder-Wisconsin)
W75-02645

REGIONAL ENVIRONMENTAL QUALITY: AN OPTIMAL INDUSTRY MIX TO MINIMIZE POLLUTION: COMMENT,
Tennessee Technological Univ., Cookeville.
For primary bibliographic entry see Field 6B.
W75-02665

RECREATION: ECONOMIC DEVELOPMENT IMPACT AND SEASONALITY: COMMENT,
Georgia State Univ., Atlanta.
For primary bibliographic entry see Field 6B.
W75-02667

EFFECTS OF SUSPENDED SOLIDS ON PRIMARY CLARIFIER SIZE OPTIMIZATION,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W75-02685

ACTIVATED SLUDGE HYDRAULIC-CONTROL TECHNIQUES EVALUATION BY COMPUTER SIMULATION,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-02686

REGRESSION ANALYSIS APPLIED TO THE WASTEWATER TREATMENT FIELD,
Kentucky Univ., Lexington, Dept. of Economics.
For primary bibliographic entry see Field 5D.
W75-02687

ECONOMIC PIPE SIZING IN PUMPED IRRIGATION SYSTEMS,
Stellenbosch Univ. (South Africa). Dept. of Agricultural Engineering.
R. P. Perold.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR4, Proceedings paper No 10988, p 425-441, December 1974. 7 fig, 1 tab, 30 equ, 11 ref.

Descriptors: *Irrigation, *Pumping, *Pipes, *Sizing, *Cost analysis, Optimization, Hazen-Williams equation, Design, Conduits, Pumping plants, Systems analysis, Equations.
Identifiers: *Economic analysis, *Breakeven point, Cost minimization, Diameters, Selection.

A method for general application is developed whereby the minimum cost pipe sizes in a pumped irrigation system are found by determining the flow rates at which pipe sizes should be changed from one size to the next, according to the time pumped per year. Use of the method in the design of branched flow systems is examined for both fixed head and variable head pumping plants. Design charts are constructed giving the breakeven annual times at which two neighboring sizes would be equally economical and drawn against pipe flow for various pipe diameter sequences. Results of applying the method to the example problem of design for a variable pressure pumping unit indicate an approximate 3% reduction in the total annual cost as compared to the fixed pressure design, but with 6-1/2% increase in the maximum pumping pressure and installed horsepower. (Bell-Cornell)
W75-02688

IRRIGATION STORAGE PROBABILITIES OF SMALL RESERVOIRS,
Agricultural Research Service, Columbia, Mo. Watershed Research Unit.
L. A. Kramer.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers Vol 100, No IR4, Proceedings paper No 10987, p 485-494, December 1974. 6 fig, 1 tab, 9 equ, 6 ref.

Descriptors: *Reservoir storage, *Probability, *Hydrology, *Irrigation, *Markov processes, Mathematical models, Equations, Watershed(Basins), Irrigation efficiency, Methodology, Systems analysis.
Identifiers: Reservoir capacity, Failure probability.

Supplemental irrigation systems using a reservoir for water supply storage can be designed with a known risk of having inadequate storage to satisfy the yearly irrigation requirements. The relationships between irrigation demand, reservoir capacity, and reservoir failure probability were determined for a gaged reservoir watershed by applying a Markov Chain reservoir storage probability model. Reservoir failure was defined as the annual probability of storage depletion. Failure occurs when there is insufficient water in storage to satisfy the annual irrigation demand. Data from the McCredie reservoir watershed for the period 1942-1968 were utilized in the model. These twenty-seven years of observed and modeled reservoir budget data for a 97-acre-ft reservoir and a 154-acre watershed were used to develop the demand-capacity-probability relationships for demands ranging from 0 acres to 100 acres of irrigated corn, reservoir capacities ranging from 40 acre-ft to 200 acre-ft, and failure probability of 1% to 50%. The effect of varying irrigation efficiency on these relationships was also examined. This probability model could be used to define failure probabilities of the supplemental irrigation storage reservoir for small agricultural watersheds. (Bell-Cornell)
W75-02689

A COMPUTER-AIDED DESIGN SYSTEM FOR SERVICE RESERVOIRS,
General and Engineering Computer Services Ltd. (England).
V. P. Lane, and I. Mascarenhas.
Journal of the Institution of Water Engineers (G.B.), Vol 28, No 4, p 228-242, June 1974. 7 fig, 3 tab, 12 ref, 3 append.

Descriptors: *Computers, *Design, *Optimization, *Reservoirs, *Economics, Costs, Water resources, Structural analysis, Structural design, Economic efficiency, Engineering, Decision making, Constraints, Evaluation, Mathematical models, Projects, Systems analysis.
Identifiers: *Cost minimization, *Concrete service reservoirs, Search technique.

Described is the development and use of a computer-aided design system which incorporates cost optimization, structural analysis and design, reinforcement selection, quantities, and standard reinforcement detailing drawings. The basic C.A.D. system approach contends that whenever the decision process can be quantified, it should be computerized. Of major importance is the optimality of the complete design process. Cost minimization techniques can easily be included within the computer process: cost considerations are of prime importance in all computer applications. The design of large reinforced concrete service reservoirs is described, wherein the C.A.D. system must cater to three distinct loading cases: construction, test, and normal working loads. The optimization objective is to find the minimum cost structure which will support the given loading systems while satisfying the normal structural restrictions. A preplanned nodal or lattice search is illustrated for selecting the minimum cost roof unit and the optimum roof for a given panel size. The C.A.D. system takes basic engineering data and in one computer operation produces the design information and documents. The input data are: project identification, reservoir details, unit costs, soil characteristics and groundwater information, loading magnitudes, and general features of structural elements. (Bell-Cornell)
W75-02690

PLANNING AND CONTROL OF COMBINED SEWERAGE SYSTEMS,
San Francisco City and County Dept. of Public Works, Calif.
W. R. Glessner, R. T. Cockburn, F. H. Moss, and M. E. Noonan.
Journal of the Environmental Engineering Division, American Society of Civil Engineers Vol 100, No EE4, p 1013-1032, August, 1974. 6 fig, 4 tab, 2 ref.

Descriptors: *Waste water treatment, *Combined sewers, *Management, Planning, Overflows, California, Interceptor sewers, *Water management(Applied).
Identifiers: *Treatment plants, *San Francisco.

A detailed study of the San Francisco Bay area led to the preparation of a Master Plan for wastewater management, applying systems engineering to the use of combined waste water control and management of combined sewer overflows. Three waste water treatment plants with a combined average daily sanitary capacity of 100 mgd and an interceptor system of approximately 300 mgd peak capacity to service 43 separate combined sewer districts were investigated. Problems included control of the massive and dynamically variable wet weather periods of short duration and control of the smaller volume of dry weather flow. Water quality standards and planning alternatives were considered. It was concluded that a combined sewer system with added storage and enlarged treatment to reduce overflows will provide a higher level of water quality protection than separate storm and sanitary systems. (Prague-FIRL)
W75-02697

SCREENING MODEL FOR STORM WATER CONTROL,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W75-02699

6B. Evaluation Process

THE SIGNIFICANCE OF GEOLOGY IN SOME CURRENT WATER RESOURCE PROBLEMS, CANTERBURY PLAINS, NEW ZEALAND,
New Zealand Geological Survey, Christchurch.
For primary bibliographic entry see Field 2A.
W75-02383

WATER FOR THE HUMAN ENVIRONMENT, VOLUME II, COUNTRY REPORTS.
For primary bibliographic entry see Field 2A.
W75-02440

STATUS OF WATER RESOURCES IN EGYPT,
For primary bibliographic entry see Field 2A.
W75-02441

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN TANZANIA,
Ministry of Water Development and Power, Dar es Salaam (Tanzania).
For primary bibliographic entry see Field 2A.
W75-02443

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN INDIA,
Ministry of Irrigation and Power, New Delhi (India).
For primary bibliographic entry see Field 2A.
W75-02446

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN MALAYSIA,
Drainage and Irrigation Dept., Kuala Lumpur (Malaysia).
For primary bibliographic entry see Field 2A.
W75-02448

WATER RESOURCES IN POLAND--TODAY AND IN THE FUTURE,
Technical Univ. of Warsaw (Poland). Inst. of Environmental Engineering.
For primary bibliographic entry see Field 2A.
W75-02461

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN THE UNITED STATES,
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 2A.
W75-02469

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT,
National Pollution Control Commission, Manila (Philippines).
R. M. Lesaca.
In: Water for the Human Environment, Volume II, Country Reports; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. p 161-173, 7 ref, 3 append.

Descriptors: *Water resources, *Water resources development, *Asia, Water quality, Water pollution control, River basin development, Industrial wastes, Flood control, Water demand, Chemical wastes.
Identifiers: *Republic of the Philippines.

Among the major programs undertaken by the government of the Republic of the Philippines geared towards national economic growth is the massive water resources development scheme. The program embodies the maintenance of an acceptable water quality and the full utilization of the country's water resources. The government has taken steps to control and minimize the degradation of water bodies through the enforcement of pollution control. Simultaneously, the country's six major river basins are being developed for domestic and agro-industrial uses and flood control through coordinated schemes in water resources development. (See also W75-02440) (Scott-ISWS)
W75-02470

HYDROLOGY AND WATER RESOURCES DEVELOPMENT,
Rijkswaterstaat, The Hague (Netherlands).
For primary bibliographic entry see Field 2A.
W75-02478

THE ROLE OF HYDROLOGY IN ECONOMIC AND SOCIAL DEVELOPMENT, (ROL GIDROLOGII V EKONOMICHESIKOM. I. SOTSIALNOM RAZVITII),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2A.
W75-02479

INVENTORY OF MAJOR ESTUARINE SYSTEMS IN NEW JERSEY,
New Jersey Dept. of Environmental Protection, Trenton. Div. of Fish, Game and Shellfish.
J. F. McClain, Jr., J. R. Makai, and P. E. Hamer.
Available from the National Technical Information Service as COM-73 11106, $4.75 in paper copy, $2.25 in microfiche. Report No. NOAA-73070415, July 1971. 147 p. 30 fig, 80 tab, 90 ref.

Descriptors: *Census, *Estuaries, *New Jersey, *Fish, Physiochemical properties, Systematics, Salinity, Mapping, Nitrates, Phosphates, Ammonia, Sport fishing, Turbidity, Chlorinated hydrocarbon pesticides, Pesticide residues, Land use, Hunting.
Identifiers: Great Bay(NJ), Mullica River(NJ), Maurice River(NJ), Manasquan River(NJ).

Phase I of the 1969-1970 estuarine inventory consisted of a survey of the fishes of the Great Bay-Mullica River system, and to a lesser extent, the Maurice and Manasquan Rivers to determine the species of finfish in the estuarine waters of New Jersey. Monthly sampling surveys recorded conditions from 1968 into August 1970. Five seining stations were utilized in the Mullica-River Great Bay Estuary, three in the Manasquan River and three in the Maurice River and were sampled monthly when possible. Sixty species of finfish were taken during the sampling period. Species taken in the Great Bay-Mullica River Estuary are listed with common and scientific names. The number of species at each station, temperature and salinity at seining stations are given. In Phase II, the Mullica-Great Bay Estuary was mapped and monthly sampling surveys were carried out ot record physical-chemical conditions on a yearly basis. These included temperatures, salinity, pH, nitrates, phosphates, ammonia, free carbon analysis, turbidity, pesticide analysis, land usage, and extent of sport fishing and waterfowl hunting. (Jones-Wisconsin)
W75-02498

A WATER POLICY-LAND USE COMPUTER SIMULATION MODEL,
Missouri Univ., St. Louis. Dept. of Quantitative Management.
For primary bibliographic entry see Field 6A.
W75-02507

ENVIRONMENT UPDATE,
For primary bibliographic entry see Field 6A.
W75-02554

ENVIRONMENTAL POLICIES CALL FOR NEW PROFESSIONALISM IN ENGINEERING, SCIENCE,
For primary bibliographic entry see Field 6C.
W75-02555

THE POULTRY PROCESSING INDUSTRY: A STUDY OF THE IMPACT OF WATER POLLUTION CONTROL COSTS,
Economic Research Service, Washington, D.C.
J. G. Vertrees.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-229 988, $4.25 in paper copy, $2.25 in microfiche. Report, June 1972. 54 p, 33 tab, 1 fig, 17 ref.

Descriptors: *Poultry, *Industrial wastes, *Water pollution control, Cost analysis, Capital costs, Water quality control, Waste water treatment, Food processing industry.

Recent federal water quality legislation will force the poultry processing industry to undertake large capital investments to meet the standards. A 1971 USDA survey of poultry slaughtering indicates that of the 386 respondents, 245 had final municipal waste treatment, 113 had private treatment, and 28 had no treatment. Surveyed plants have an estimated investment in private treatment facilities of $7.1 to $20.3 million with average replacement values ranging from $63,000 to $180,000/plant with private treatment. Operating and maintenance costs ranged from 2.7 to 7.3 cents/100 lb. of live weight slaughter. Current waste water treatment costs range from 0.5 to 1.9% of total costs. Achieving the best practicable control technology (assumed to be an anaerobic - aerobic lagoon system) will require expenditures of $35,000 to $109,000/plant in the 44 respondent plants having no or only primary treatment facilities. A total investment of $149,000 to $424,000/plant would be required for the 141 plants to achieve the best available technology which is assumed to be an extended aeration system. Total investment costs to achieve the last practicable and available technology range over $1.5-4.5 million and $21-60 million respectively. (Schroeder-Wisconsin)
W75-02608

1971 SIUSLAW RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Portland. Div. of Management and Research.
T. Gaumer, D. Demory, and L. Osis.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10392, $4.75 in paper copy, $2.25 in microfiche. Report January 1974. 28 p, 6 fig, 16 tab. DACW 57-72-C-0138, NOAA N208-0073-72(N), and NO4-3-208-55.

Descriptors: *Fishing, *Fish management, Oregon, Estuarine fisheries, Recreation demand, Recreation.
Identifiers: Oregon Fish Commission, Siuslaw River Estuary(Ore), Lane County(Ore).

During an eight month period in 1971, the Oregon Fish Commission interviewed 5,031 boat and shore anglers and tideflat users in the Siuslaw River Estuary for catch, effort, and angler origin. The 2,245 acre bay, located 202 miles south of the Columbia River, contains 756 acres of tideflat. Results of the survey were used to complete maps on principal boat fishing areas, clam beds, eel grass beds, and fish feeding and migration areas. A total of 32,600 resource user trips (4,200 boat, 22,500 shore, and 5,900 tideflat) encompassed 83,400 hours of effort. Anglers harvested 184,400 animals (143,100 clams, 33,600 fish, 7,000 crabs, and 700 miscellaneous invertebrates). Dungeness crabs, finfish, and softshell clams represented the primary catches for boat and shore anglers and tideflat users. Commercial lands within the estuary equalled 13,372 pounds valued at $2,160 during the period. Shad was the principal species landed, followed by dungeness crab. Seventy percent of the resource users for the three fisheries were residents of Oregon living outside of Western Lane County. (Schroeder-Wisconsin)
W75-02609

TAVASCI MARSH NATURAL AREA REPORT NO. 1,
Arizona Academy of Science, Tempe.
E. L. Smith, and G. L. Bender.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-225 217, $3.75 in paper copy, $2.25 in microfiche. Report OEPAD-EP-73-1, June 1973. 25 p, 3 fig, 1 tab, 4 photos, 6 ref. HUD CPA-AZ-00-16-1008.

Descriptors: *Natural resources, *Land management, Arizona, Conservation, Land classification, Marsh management, Wildlife management, Freshwater marshes, Preservation.
Identifiers: *Tavasci Marsh(Ariz), Verde River(Ariz).

Survey results of the water chemistry, geology, flora, and fauna of the Tavasci Marsh have indicated that it be given educational and/or scientific natural area status. The marsh, located in central Arizona, represents an oxbow remnant of Verde River. Water for the marsh is derived from the 20-inch annual rainfall and natural springs. The most unusual faunal elements in the area are Virginia and Sora Rails, two species of birds inhabiting the cattail marsh, who may use the marsh as a breeding area in Yavapai County. The marsh is active physiologically and likely to be oxygen depleted during the summer, according to water chemistry data collected December 5-7, 1972. The marsh lies adjacent to the Tuzigoot National Monument, site of prehistoric, pueblo-type dwellings, and may have represented a hunting area for early inhabitants. Recommendations assert that the unusual biota, the educational and scientific values, and studies of marshland succession, limnology and biology, can best be protected by giving natural area status to the site extending 1/4 mile on either side of the marsh and 1/2 mile upstream and downstream. Ideally the natural area would be under the stewardship of Tuzigoot National Monument. (Schroeder-Wisconsin)
W75-02611

THE FINANCIAL FEASIBILITY OF THE REGIONAL APPROACH TO PUBLIC WATER SUPPLY: A CASE STUDY OF NORTHWEST ARKANSAS,
Arkansas Univ., Fayetteville. Agricultural Experiment Station.
N. C. Williams, and J. M. Redfern.
Bulletin 788, June 1974. 28 p, 1 fig, 5 tab, 18 ref, 4 append.

Descriptors: Arkansas, Water supply development, Comprehensive planning, Regional development, Water distribution, Financial feasibility, Water requirements.
Identifiers: Washington County(Ark), Benton County(Ark), Beaver Reservoir.

The financial feasibility of creating a two-county regional water system to satisfy projected 1980 water demands in Washington and Benton Counties, Arkansas and investigated. The modeling effort began with development of high population projections for rural and urban areas in the region, utilizing the constant percent growth rate method. Low projections were obtained by examining factors influencing population growth, then the population estimates were converted into household projections. Household daily water use rates plus an additional 10% of the daily demand to account for system losses resulted in a projected 1980 demand of 27,363 gpd. Total investment cost to meet daily consumption rates utilizing the regional approach was $37,582,293 (1980 dollars) with interest charges during construction totaling $2,536, 805 at 4.5% interest rate. If the investment cost of local water service provision is subtracted, the incremental regional cost is $17,908, 736. Variable costs under a regional or local water system were 11.94 cents and 33.13 cents/1000 gallons, yielding a net regional benefit of 21.91 cents/1000 gallons. The regional approach is found financially feasible; the rate of return from this approach (11.8%) exceeds the cost of capital and revenue bonds will be satisfied in a minimum of 12 years. (Schroeder-Wisconsin)
W75-02616

CONCEPT DESIGN AND COST ANALYSIS OF RESTRICTED DRAFT DRY BULK CARRIERS,
Hydronautics Inc., Laurel, Md.
H. W. Lain, G. W. Peters, and D. P. Roseman.
Army Engineer Institute for Water Resources IWR Contract Report 73-5 (Final Technical Report 12-22-72/7-21-73). November 1973. 111 p, 20 fig, 30 tab, 8 drawings, 8 ref.

Descriptors: *Ships, *Design data, Transportation, Navigation, Harbors, Cost analysis, Construction.
Identifiers: *Bulk carriers, Restricted draft, Ship construction.

The feasibility, conceptual design, and estimated costs of restricted draft day bulk carriers to service major coastal ports in the U.S. are assessed. Design and cost characteristics are compared for the conventional and restricted draft design. The preliminary characteristics of each design-breath, depth, draft, total dead weight, cargo deadweight, machinery, fuel rate, and service speed stability were selected from a computer study directed to develop the maximum feasible capacity for a given draft. Results of the study indicate that for the three specific drafts, 35 feet, 45 feet and 55 feet observed gains in maximum deadweight of the restricted draft design over the conventional design. Capital costs/DWT of the restricted draft and deep draft vessels were $164.53 and $162.48; and $124.31 and $120.36 for nominal deadweights of 60,000 and 125,000. Operating and support costs, excluding fuel are 1-1/2 - 3-1/2 percent higher for the restricted draft than the conventional draft. Fuel costs are also generally higher for the restricted design. Problem areas associated with the restricted draft include directional instability, cargo handling difficulties and seakeeping. None are seen as barriers to restricted draft development. (Schroeder-Wisconsin)
W75-02618

LEAST-COST DESIGN OF WATER DISTRIBUTION SYSTEMS,
Western Australia Univ., Nedlands. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W75-02619

ABUNDANCE ESTIMATIONS AND GROWTH-RATE COMPARISONS FOR THE CLAM PROTOTHACA STAMINEA FROM THREE BEACHES IN PRINCE WILLIAM SOUND, ALASKA, WITH ADDITIONAL COMMENTS ON SIZE-WEIGHT RELATIONSHIPS, HARVESTING AND MARKETING,
Alaska Univ., College. Inst. of Marine Science.
H. M. Feder, and A. J. Paul.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-74-10601, $3.75 in paper copy, $2.25 in microfiche. Sea Grant Report No 73-2, 34 p, 1973. 6 tab, 9 fig, 3 ref. NOAA 04-3-158-41.

Descriptors: *Clams, *Harvesting, *Marketing, Fish management, Agriculture, Alaska, Shellfish farming, Growth rate, Annual growth.
Identifiers: Protothaca staminea, Galena Bay(Ala), Prince William Sound.

Results indicate densities of 83,000, 147,900 and 1,159,500 clams for beaches and the mud flat. Average densities range from 17-23 clams per 0.25 sq m. 8-10 years of growth were required for the littleneck clam to reach a harvestable size (30 mm). Meat solids average about 13.6% of the total weight for 73 clams ranging in length from 17.0-44.0 mm. Pilot studies utilizing hydraulic pumping techniques to harvest the littleneck clams indicate that this system would result in a successful small commercial operation. Potential markets for the littleneck clam are also discussed. Population estimates of harvestable size littleneck clams were undertaken in 1971 for two beaches and one mud flat in Galena Bay, Prince William Sound, Alaska. For each study area three transects were dug to obtain specimens. Abundance estimates were obtained by averaging the number of clams found in the transect from the two beaches and multiplying the value obtained by the length of beach. In the mud flat where every fifth sampling station within the transect was sampled, the population estimation was multiplied by five to obtain a value for the entire beach. (Schroeder-Wisconsin)
W75-02622

ECONOMIC PIPE SIZING FOR GRAVITY SPRINKLER SYSTEMS,
Stellenbosch Univ., (South Africa).
For primary bibliographic entry see Field 6A.
W75-02625

1971 NETARTS BAY ESTUARY RESOURCH USE STUDY,
Oregon Fish Commission, Portland. Div. of Management and Research.
T. Gaumer, D. Demory, and L. Osis.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-74-10590, $3.75 in paper copy, $2.25 in microfiche. Report January 1974. 28 p, 7 fig, 16 tab. DACW 57-72-C-0138, N208-0073-72(N) and N04-3-208-55.

Descriptors: *Fishing, *Estuarine fisheries, *Fish management, Recreation demand, Recreation, Shellfish, Fish.
Identifiers: Netarts Bay(Ore), Columbia River, Tillamook County(Ore).

Results of a 1971 Oregon Fish Commission Study of recreational uses of marine food fish, shellfish and miscellaneous invertebrates, conducted in Netarts Bay, are presented. The 2,325 acre bay, located 73 miles south of the Columbia Bay, contains 1,513 acres of tideland. 7,827 boats, shore, tideflat and scuba users were interviewed over the eight month period for preparation of several maps detailing principal boat fishing areas, clam beds, eel grass beds, commercial oyster leases and potential oyster growing areas, feeding areas and migration routes. A total of 30,800 resource user trips (10,700 boat, 5,500 shore and 14,600 tide lat) encompassing 64,100 hours of effort (35,300; 9,500 and 19,300 respectively) occurred during the study period. Angler harvested 292,600 animals (232,900 clams, 28,000 miscellaneous invertebrates, 23,800 crabs, and 7,900 fish). Dungeness crabs comprised 75% of the boat anglers' catch. Kelp greenling and black rockfish were the principal species taken by the shore anglers. Tideflat users' catch was primarily gaper and cockle clams. 75% of the anglers interviewed were Oregon residents living outside Tillamook County. Commercial findings totaled 23,359 pounds valued at $5,272 during 1971. Mappings also indicate that commercial oyster growing areas presently involving 82 acres may feasibly be expanded to 1500 acres. (Schroeder-Wisconsin)
W75-02628

CHETCO AND ROGUE RIVER ESTUARIES,
Oregon Fish Commission, Portland. Div. of Management and Research.
T. Gaumer, D. Demory, and L. Osis.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-73-11926, $3.75 in paper copy, $2.25 in microfiche. Report August 1973. 28 p, 7 fig, 17 tab. DACW 57-72-C-0138, NOAA N208-0083-72(N) and N04-3-208-55.

Descriptors: *Fisheries, *Estuarine fisheries, Fishing, Oregon, Recreation, Boating, Fish harvest, Marine fish, Marine fisheries, Fish migration, Crabs.
Identifiers: *Chetco Estuary(Ore), *Rogue River Estuary(Ore), Curry County(Ore), Anchovies.

In 1971, the Oregon Fish Commission interviewed 2,412 boat and shore anglers in the Chetco River Estuary, and 41 shore anglers in the Rogue River Estuary to determine catch, effort, and angler origin data for each. The anadromous sports fisheries in the upper portions of these estuaries were excluded. Marine maps were prepared for each, utilizing the interview data and previous Fish Commission studies of principal boat fishing areas, food production areas, fish feeding areas, and fish migration routes. Results for the Chetco Estuary reveal 23,200 resource user trips (1,600 boat and 21,600 shore) or 53,100 hours of fishing effort (6,100 boat and 47,000 shore) during the study. Anglers of the two fisheries harvested 42,800 animals (42,600 fish and 200 crabs) with northern anchovies the primary catch for both fisheries. Oregon residents living outside Curry County made up 49% of the resource users. Results from the Rogue Estuary study indicate 350 shore angler trips or 600 hours of effort were expended during the study to catch 600 redtail surfperch. This study was terminated prematurely due to a lack of personnel. (Schroeder-Wisconsin)
W75-02630

THE PERFORMANCE AND ECONOMICS OF A SERIES HYBRID COOLING TOWER,
Cornell Univ., Ithaca, N.Y. Cornell Energy Project.
K. Smith.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-227 813, $4.75 in paper copy, $2.25 in microfiche. Report No NSF-RA-IN-72-017, May 1972. 86 p, 4 tab, 26 ref, 11 ref. NSF GI-29903X.

Descriptors: Heat transfer, Cooling, *Cooling towers, Engineering structures, Electric power production, *Thermal pollution, Electric power costs, Cost comparisons.
Identifiers: Dry cooling towers, Evaporative cooling towers, Hybrid cooling towers, Spray cooling towers.

The design, performance and economics of a dry cooling system, a continuously operating two stage hybrid system, and a spray cooling tower are compared to a conventional packed evaporative tower. All systems are natural draft. The dry tower is of Heller variety, with a cross flow scheme. The hybrids utilize crossflow spray sections located at the shell base and extended radially outward from the vertical dry cooler. The hybrid towers are characterized as nearly linear superpositions of dry and conventional evaporational systems in terms of tower height, make-up water required, and capacity loss at high air temperature. For a 120 Mw plant the dry tower cost would be .47 mills/KWH more than evaporative towers, hybrids cost an additional .36 mills/KWH and .20 mills/KWH over conventional wet systems for 25% and 50% reliance on wet cooling, respectively. The dry and hybrid costs can be reduced by fuel and transmission savings due to increased siting flexibility. The hybrids water usage, however, limits its applicability in arid areas. Inclusion of a spray tower in the analysis indicates that such a tower might replace conventional packed systems at no or some beneficial effects since the latter is subject to wear and decay. (Schroeder-Wisconsin)
W75-02631

KENTUCKY LAKE COMMERCIAL CATFISH CATCH ANALYSIS,
Murray State Univ., Kentucky. Biological Station.
P. J. Mattahi.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-73-11185, $4.25 in paper copy, $2.25 in microfiche. Final Report June 30, 1972. 56 p, 3 fig, 24 tab, 7 ref. 4-70-R.

Descriptors: *Fish management, Commercial fishing, Fishing gear, Kentucky, Commercial fish, Catfishes.
Identifiers: Kentucky Lake(Ky).

The purposes of this investigation were to record the total catch from Kentucky Lake of selected commercial fishermen as the fish were removed from gear, and to provide comparisons of age, growth, and condition of blue and channel catfish with previous data. Six different commercial fishermen were contacted and an average of two trips/week were arranged over a two year period, June 1970-June 1972. Gear used were bait lines and gill nets. Data, consisting of length and weight, were collected for fish caught. Dorsal spines were removed from selected blue and channel catfish (B and CC) to determine age and growth. Conditions of plumpness, wellbeing, and length-weight relationships were computed. Results indicate that 497 and 531 bait lines captured 3,595 and 4,611 fish in the 1970-71 and 1971-72 periods. B and CC constituted 92 and 95% of the total catch respectevely with game fish representing 4.1 and 2.6%. 141 and 155 gill nets yielded 401 and 453 fish over the same periods with buffalo fish constituting 42 and 42%, respectively, of the total catch. (Schroeder-Wisconsin)
W75-02632

AN INTERPRETATIVE ANALYSIS OF FAMILY AND INDIVIDUAL ECONOMIC COSTS DUE TO WATER RESOURCE DEVELOPMENT,
Kentucky Univ., Lexington. Dept. of Sociology.
J. F. Donnermeyer, P. F. Korsching, and R. J. Burdge.
Water Resources Bulletin, Vol 10, No 1, p 91-100, 1974. 9 tab, 16 ref.

Descriptors: *Economic impact, *Water resources development, *Relocation, Regional development, Cost analysis, Kentucky.
Identifiers: Carr Fork Reservoir(Ky).

Hidden economic costs associated with forced relocation caused by water resource projects are often not covered by existing compensation practices. A number of these economic adjustment problems are highlighted in a survey of 200 families relocated by the Carr Fork Reservoir in the Coal Regions of Eastern Kentucky. One-third of the respondents indicated that their financial situation had worsened despite Federal reseattlement payments they received. Of those indicating a worsened financial condition, over 25% associated the decline with higher living costs, while nearly 30% associated it directly with relocation related activities. Thirty percent of the respondents indicated greater financial indebtedness than before relocation. Partially this change was a result of disintegration of the mountain culture which valued being debt free. Economic losses were not randomly distributed among relocated persons. Land owners, older families with one or two members, low income persons, and long time area residents bore the greatest burden of the relocation process. (Schroeder-Wisconsin)
W75-02635

WHAT IS THE COST OF MONEY,
Stone and Webster Management Consultants, Inc., New York.
R. S. Jackson.
Journal American Water Water Works Association, Vol 65, No 9, p 575-578, 1973. 1 fig.

Descriptors: *Public utilities, *Debt, *Financing, Capital costs, Interest rates, Return(Monetary).

Proper debt and money cost management are of paramount importance for public utilities, not only to their success as viable enterprises but also to their success in making the resulting benefits redound to their customers. During periods of low-interest rates, utilities have often issued high interest bonds and debentures. In order to do so, however, the issuer had to pay a premium to a bondholder. Thus, the company would call the bonds if the reductions in interest rates were sufficient to cover their refunding costs. In such cases, long-term debt investors would lose their high return issues. In periods of rising interest rates, most companies let the bonds go to maturity to take advantage of the low interest rates. In summary, the long-term debt investor bears the brunt of either inflationary or deflationary trends. This is a primary wedge driving out many insurance companies from utilizing a utility long-term debt as potential investment. Such a loss of potential investment sources portend ill for the future rates that utilities must pay. It is incumbant for money managers to develop innovative techniques which maintain their investment resources to minimize the long-run cost of capital. (Schroeder-Wisconsin)
W75-02636

ECONOMIC IMPLICATIONS OF ALTERNATIVE ALLOCATIONS OF AN EXHAUSTIBLE IRRIGATION WATER SUPPLY,
Texas A and M Univ., College Station. Dept. of Agricultural Economics and Rural Sociology.
R. D. Lacewell, and H. W. Grubb.
Southern Journal of Agricultural Economics, Vol 3, No 1, p 149-154, 1971. 1 tab, 5 ref.

Descriptors: *Irrigation, *Irrigation practices, *Economic efficiency, *Discount rate, *Planning, Farm management, Groundwater basins, Texas, Optimum development plans, Linear programming, Groundwater potential.
Identifiers: Ogallala formation(Tex).

The impacts of changes in the discount rates and changes in the annual irrigation levels and cropping patterns on the optimal exhaustible groundwater resource development plan are explored for the Texas Ogallala formation. The 530,000 acre hydrologic area presently produces irrigated crops including cotton, grain sorghum, and wheat; the irrigation water boosts each crop's yields by 2, 6, and 3 times, respectively. Techniques of linear programming to allocate water among alternative crops and alternative crop production techniques for given production periods were used. The model includes the relevant range of dry land and irrigated cropland and resource constraints. Water constraints were structured to permit variations in the annual water supply for the purpose of generating alternative time streams of net income to water. Differing discount rates ranging from 0, 6, and 10% optimal use patterns lead to water supply values of $47,800, $182,000, and $130,000, respectively. Irrigation under each of these rates would last for 214, 29, and 29 years, respectively. Increases in irrigation water requirements would reduce the total irrigation life under the plan chosen for the 6 and 10% rates from 29 to 27 years. (Schroeder-Wisconsin)
W75-02638

COASE EXTERNALITY THEORY IN A POLICY CONTEXT,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6A.
W75-02645

THE COASE THEOREM AND THE STUDY OF LAW AND ECONOMICS,
Michigan State Univ., East Lansing. Dept. of Economics.
W. J. Samuels.
Natural Resources Journal, Vol 14, No 1, p 1-33, 1974. 51 ref.

Descriptors: *Economic efficiency, Income distribution, Institutions, Equity, Regulation, Resource allocation, Optimization, Costs.
Identifiers: *Coase theory, Externalities, Property rights.

A comprehensive critique of the coasion analysis, the positive analytic meaning and significance of the neutrality theorem, the probative value of its normative message, and its place in the study of law and economics is presented. It is assumed that the coasion analysis integrates two arguments: (1) through the definition of property rights and the creation of markets for externalities, opportunities for gains from trade can lead to bargaining and the exchange of rights, and thereby to an internalization of externalities; and (2) the allocation of resources is independent of property rights and liability rules. A summary of the analysis presented suggests that: (1) the coase theorem is primarily a normative proposition and involves ideological symbol manipulation often justifying the status quo; (2) analytically, it represents a part of equilibrium model and chain of reasoning inclusive only of a selected subset of variables; and (3) the coase theorem abstracts from the ways in which rights and liability rules have allocative effects and then concludes that rights and liability rules are neutral in regard to allocation. (Schroeder-Wisconsin)
W75-02646

ECONOMICS OF FISHERY MANAGEMENT,
Food and Agriculture Organization of the United Nations, Rome (Italy). Dept. of Fisheries.
For primary bibliographic entry see Field 8I.
W75-02647

TRENDS IN WATER-MAIN EXTENSION POLICY,
Little Rock Municipal Water Works, Ark.
G. S. Allen.
Journal of American Water Works Association, Vol 65, No 10, p 611-616, 1973. 1 ref.

Descriptors: *Conduits, *Planning, *Water conveyance, Water distribution, Applied financing, Equity, Use rates, Arkansas, Oklahoma, Texas, Louisiana, Tennessee, Utilities, Water works.
Identifiers: Policies.

The impacts of water utility expansion on their rate structure, facility master plan, and financial plans are considered. Extention policies should seek to promote high-quality service to all customers, provide an equitable distribution of costs, and maintain an optimal balance among capacity treatment and distribution considerations. A survey was initially conducted to evaluate extention policies of the Little Rock Arkansas Municipal Water Works. Questionnaires were also sent to 12 water utilities in five states. Responses were received from eight utilities plus one from Little Rock. All utilities reported that installation of principal transmission and distribution facilities were based on master plans varying in length from 5-20 years and were updated every 1-5 years. Five had system boundaries conforming to political subdivisions, although trends indicated greater willingness to base system boundaries on engineering and economic factors. All utilities participated in the cost of distributing the system facilities to some extent. Utilities were involved in the design and allocation of costs for individual extensions, in-tract, offsite, and special facilities. Other issues surveyed included financing, provisions of services to other systems, planning staffs, and the utilities' relationships to land use planning commissions. (Schroeder-Wisconsin)
W75-02648

CHEAP POWER--AN EXPENSIVE FAILURE: HYDRO-ELECTRIC POWER AND INDUSTRIAL DEVELOPMENT IN NEWFOUNDLAND,
Macquarie Univ., North Ryde (Australia). School of Earth Sciences.
P. Crabb.
Water Resources Bulletin, Vol 10, No 1, p 42-53, 1974. 2 fig, 4 tab, 19 ref.

Descriptors: *Hydroelectric power, *Regional development, Project planning, Environmental effects, Employment opportunities, Labor supply.
Identifiers: Newfoundland(Can).

A case study of the failure of Newfoundland's cheap power policy to improve economic, environmental, and employment conditions is presented. From the beginning, the economic justification of exploiting the province's water resources for new electricity generation, aside from that already committed elsewhere, was meagre even with major modifications of natural stream flow patterns. To meet existing demand deficits and expected future industrial demands two major projects were undertaken simultaneously: the building of an island-wide transmission grid and the construction of a $164 million hydroelectric plant producing 459,000kW. In 1968 a $52 million oil -fired power plant was constructed at Holyrood, Conception Bay capable of producing an additional 300,000 kW. Results of the regional development program have been dismal. Only one company, producing elementary phosphorous, was attracted. Federal and provinical supports were also extended to the company. The cost of poor planning was high. The environmental degradation from hastily constructed power plants and company effluents have raised the toll. Meanwhile Newfoundland's small job market and large unemployment levels remain. (Schroeder-Wisconsin)
W75-02653

PORT DEVELOPMENT IN THE EUROPEAN ECONOMIC COMMUNITY,
Port of Rotterdam (Netherlands).
For primary bibliographic entry see Field 6E.
W75-02655

ASSESSING THE INTANGIBLES IN WATER POLLUTION CONTROL,
Sussex Univ., Brighton (England).
For primary bibliographic entry see Field 5G.
W75-02657

HYDROPOWER VS. WILDERNESS WATERWAY: THE ECONOMICS OF PROJECT JUSTIFICATION THROUGH THE SIXTIES,
Connecticut Univ., Storrs. Dept. of Environmental Economics.
C. D. Stern.
Journal of Leisure Research, Vol 6, No 1, p 46-57, 1974. 33 ref.

Descriptors: *Cost-benefit analysis, *Water resources development, *Hydroelectric power, Recreation demand, Wild rivers, Decision making, Water utilization, Environmental effects, Montana, Missouri River, Legal aspects.
Identifiers: *Federal Water Project Act, National Environmental Policy Act.

A 1963 Dept. of the Interior and Army Corps of Engineers report recommending construction of a hydroelectric facility on the last major natural beach on the Missouri River is critiqued. The 200 mile segment located in Montana was under investigation by the Corps for hydro-power and by the Park Service for the nation's first wilderness waterway. The conflict ended with the economics of wilderness recreation easily eclipsed by benefit cost (B/C) ratios developed by hydroelectric proponents. The report is criticized first because it is supply - rather than demand-oriented. It assumes demand will always exist. The report also treated th 11 alternatives as comparable investments when the wilderness waterway cost $8 million, the dam $400 million. The report's use of a single B/C table to display the alternatives also discriminates against many waterway benefits not amenable to quantification. Using the differentiated values of Supplement 1, Senate Doc. 97 the wilderness waterway would have had the superior B/C ratio. The supplement values are also criticized for use of an average willingness to pay and the failure to include option demand. Impacts of the Federal Water Project Act of 1965 and NEPA on the choice of alternatives are discussed. (Schroeder-Wisconsin)
W75-02660

THE ROLE OF USER FEES AND CONGESTION TOLLS IN THE MANAGEMENT OF INLAND WATERWAYS,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering; and Johns Hopkins Univ., Baltimore, Md. Dept. of Political Economy.
For primary bibliographic entry see Field 6C.
W75-02661

REGIONAL ENVIRONMENTAL QUALITY: AN OPTIMAL INDUSTRY MIX TO MINIMIZE POLLUTION,
Mars Hill Coll., S.C.; and Clemson Univ., S.C.
T. C. Meadows, and J. C. Hite.
Review of Regional Studies, Vol 3, No 2, Winter 1972-1973. p 149-158, 4 tab, 11 ref.

Descriptors: *Environmental effects, *Recreation, Regional development, Employment opportunities, South Carolina.
Identifiers: Charleston-Beaufort(So Carolina).

The environmental impact of developing a regional recreation-oriented industry is explored for the Charleston-Beaufort County area of South Carolina. The approach utilizes a linear programming model which minimizes BOD emissions subject to requirements that enough jobs be generated to fully employ the labor force and assure that no existing industries will be shut-down or forced to cut down their employees. Five basic industries producing food and kindred products, textiles and apparel, lumber and wood products, and tourism, located in the region were studied. Solutions to the linear programming problem indicate that tourism emerges as a major employer in the region. Such a solution is a predictable result if one observes that tourism produces the least BOD/100 employees of all the industries considered. Per capita income in both areas under the optimal solution is below the national average with per capita income in Beaufort one third greater than Charleston. Charleston's total sales under the model's optimum are actually lower than the real 1968 county level. (See also W75-02665) (Schroeder-Wisconsin)
W75-02664

REGIONAL ENVIRONMENTAL QUALITY: AN OPTIMAL INDUSTRY MIX TO MINIMIZE POLLUTION: COMMENT,
Tennessee Technological Univ., Cookeville.
H. B. Throckmorton.
Review of Regional Studies, Vol 3, No 2, Winter 1972-1973. p 167.

Descriptors: *Employment opportunities, *Recreation, Regional development, Environmental effects, South Carolina.
Identifiers: Meadows, Hite.

A critique of Meadows' and Hite's 'Regional Environmental Quality: An Optimal Industry Mix to Minimize Pollution' (see W75-02664) is presented. Central to the critique is an assertion that the linear programming model actually examines the impact of environmental quality on tourism rather than the converse. Two questions about Meadows' and Hite's conclusions are posed: (1) why is employment under existing conditions actually better than that produced by the optimization model since it yields a higher per capita income and (2) might not the lower per capita income produced by the modeling effort actually lead to greater outmigration of the labor force thereby severely restricting future economic development. The model is also criticized for failing to account for shifts in the industry's employment requirements over time and the potential introduction of new industries. (Schroeder-Wisconsin)
W75-02665

RECREATION: ECONOMIC DEVELOPMENT IMPACT AND SEASONALITY,
Missouri Univ., Rolla.
C. Garbacz.
Review of Regional Studies, Vol 3, No 2, Winter 1972-1973. p 159-165, 2 tab, 13 ref.

Descriptors: *Economic impact, *Recreation demand, Regional development, Planning, Employment opportunities, Arkansas.
Identifiers: Seasonality of employment.

Economic development impacts of recreational activities on a depressed two-county region of Arkansas are explored. The region possesses a large water impoundment completed in 1963 which has attracted a growing tourist trade. A large part of the economic base of the counties is centered on the tourist trade. A wide divergence of activities including camping, boating, fishing, skiing, swimming, sightseeing, and hiking occur in the region producing varying economic activities. The region's tourists increased from 912,000-3,039,000 over the 1963-71 period, while the labor force tied directly to the lake grew from 314 to 625. The value of outdoor recreation equipment sold near the lake also increased from $314,000 to $1,560,000. Growth in population, per capita personal income, retail sales, bank deposits and residential property values in the region are also noted, often reflecting greater increases than that of the state over time. Impacts of the recreational industry on the seasonal fluctuation in regional employment are also considered and future data needs reflecting recreational intensity indicated. (See also W75-02667) (Schroeder-Wisconsin)
W75-02666

RECREATION: ECONOMIC DEVELOPMENT IMPACT AND SEASONALITY: COMMENT,
Georgia State Univ., Atlanta.
R. H. Elrod.
Review of Regional Studies, Vol 3, No 2, Winter 1972-1973. p 169-170.

Descriptors: *Recreation demand, *Employment opportunities, Arkansas, Regional development, Income distribution, Economic impact.
Identifiers: Garbacz, Seasonality of employment.

Garbacz's 'Recreation: Economic Development Impact and Seasonality' (see W75-02666) is reviewed. Garbacz's article surveys the economic development of recreational activities on a depressed two county region in Arkansas. The critique centers on two concerns: the nature of the data used and the statistical methods employed. Garbacz indicates that intensity of visit data is essential for adequate analysis of the economic impact of recreation. A recent 1968 study does provide such data and may be helpful in Professor Garbacz's future research. The choice of nonmanufacturing employment as a proxy for recreation oriented employment is criticized because of the diversity in employment, although the lack of good data in this area is noted. Grabacz's utilization of regression analysis to determine whether seasonality of employment is related to recreational activity is also questioned. The paper concludes that Grabacz's and other studies have cast large shadows on the desirability of recreation as a panacea to depressed economic conditions. (Schroeder-Wisconsin)
W75-02667

AN APPLICATION OF TWO METHODS TO ESTIMATE THE ECONOMIC VALUE OF OUTDOOR RECREATION IN THE KISSIMMEE RIVER BASIN,
Florida Univ., Gainesville. Coll. of Agriculture.
J. F. McGuire.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 174, $5.75 in paper copy, $2.25 in microfiche. MS Thesis, 1972. 94 p, 8 tab, 4 fig, 24 ref. OWRR B-007-FLA(3).

Descriptors: *Recreation demand, *Recreation, Florida, Value, Value engineering, Mathematical models.

Identifiers: Kissimmee River Basin.

Two procedures to estimate outdoor recreational benefits (consumer surplus) are illustrated utilizing data collected from Florida's Kissimmee River Basin during the February-May, 1970 period. The basin, located in central Florida is actively involved in recreation, agriculture, and flood control activities. Access points, e.g., fishing camps, boat ramps, were utilized as interview locations. The first approach developed by Pearse involved dividing the sample of recreationists into income classes and estimating consumer surplus for each. Consumer surplus in this case equals the difference between individual travel cost and the highest travel cost within income class. By using total area visitors and average consumer surplus, total consumer surplus samples can be obtained. Under the Gibb-Edwards approach, four independent variables are utilized in conjunction with multiple linear regression analysis to derive a recreational demand curve from which consumer surplus is derived. Value of recreation/person varied from $225.24 to 21.52 under the first and second approaches and total consumer surplus for the examination period from approximately $50 million to $5 million, respectively. The use of travel costs for recreation prices, the assumed homogeneity of utility function and the uncertainty in defining income losses are noted as limitations of the first approach. (Schroeder-Wisconsin)
W75-02708

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ECONOMIC IMPACTS OF APPLYING SELECTED POLLUTION CONTROL MEASURES ON MICHIGAN DAIRY FARMS,
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 5G.
W75-02302

EXPECTATIONS, VARIANCES, AND SENSITIVITY OF NET RETURNS FROM CORN FERTILIZATION EXPERIMENTS,
Missouri Univ., Columbia.
For primary bibliographic entry see Field 3F.
W75-02396

ENVIRONMENTAL POLICIES CALL FOR NEW PROFESSIONALISM IN ENGINEERING, SCIENCE,
R. D. Grundy.
Professional Engineer, Vol 44, No 5, p 16-19, May, 1974.

Descriptors: *Future planning(Projected), *Economics, *Environmental engineering, Industries, Governments, Public health.

The current scientific and technological advances are discussed in relation to their moral and sociological impacts. Environmental policies required long-range planning for long-term interests. New terms now being used are discussed and new concepts are listed. (Ignatieff-WRSIC)
W75-02555

IN-PLANT USAGE WORKS AND WORKS,
Allied Chemical Corp., Morristown, N.J. Industrial Chemicals Div.
For primary bibliographic entry see Field 5D.
W75-02558

FEEDLOT MANURE AND OTHER AGRICULTURAL WASTES AS FUTURE MATERIAL AND ENERGY RESOURCES: III. ECONOMIC EVALUATIONS.
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5E.
W75-02588

A SENSITIVITY ANALYSIS OF SIMULATED RIVER BASIN PLANNING FOR CAPITAL BUDGETING DECISIONS,
Utah Univ., Salt Lake City. Div. of Business Administration.
For primary bibliographic entry see Field 6A.
W75-02615

INAUGURATION OF UTILITY REGULATIONS IN IOWA: THE DAVENPORT WATER COMPANY CASE,
Memphis State Univ., Tenn. Dept. of Economics.
For primary bibliographic entry see Field 6E.
W75-02649

FINANCING AND CHARGES FOR WASTEWATER SYSTEMS,
American Public Works Association, Chicago, Ill.; and Water Pollution Control Federation, Washington, D.C.
Report, 1973, 69 p, 7 tab, 3 fig.

Descriptors: *Water resources development, *Water supply development, *Financing, Cost analysis, Cost allocation, Capital costs, Administration, Government finance, Governmental interrelations, Legal aspects, Planning, Regional development, Pricing, Rates, Waste water treatment.

A compendium of wastewater management aspects is presented. Major parts and functions of wastewater systems are introduced. Elements of collation, pumping, treating and disposing within sanitary and storm sewers and combined systems are identified. Several organizational and administrative arrangements which depend on the size, number of communities involved and local and state laws are presented. Methods to provide services considered include single community control for services, joint ownership, special purpose districts, multipurpose districts, independent authorities and regional agencies. Alternative methods to cover capital costs including general obligation bonds, special assessment bonds, revenue bonds, state and federal aids, and operating revenue are considered. Several cost apportionment approaches to segregate costs among governmental entities - proportionate cost shares, assessed valuation, and incremental cost basis are illustrated, either singly or in combination. Approaches to determine annual revenue requirements are discussed. Responsibility for these costs is also discussed. A number of methods presently utilized to satisfy these requirements are highlighted: property and real estate taxes, wastewater sewer charges and connection charges. Methods to collect are also noted. A number of recommendations and procedures to establish fair rates and charges are summarized. (Schroeder-Wisconsin)
W75-02658

THE ROLE OF USER FEES AND CONGESTION TOLLS IN THE MANAGEMENT OF INLAND WATERWAYS,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering; and Johns Hopkins Univ., Baltimore, Md. Dept. of Political Economy.
S. H. Hanke, and R. K. Davis.
Water Resources Bulletin, Vol 10, No 1, p 54-65, February 1974. 1 fig, 2 tab, 23 ref.

Descriptors: *Water management(Applied), *Use rates, Efficiencies, Equity, Planning, Water resources development, Channels, Pricing.
Identifiers: *Waterways, Congestion fees, Licenses, Fuel taxes.

The introduction of inland waterway user charges and congestion fees to improve waterway efficiency and equity is explored. The present practice of allowing free use of waterways has been increasingly challenged. The practice dates back at least to the Northwest Ordinance of 1787 and may have a constitutional base. An 1886 Supreme Court case limited the latter's impact holding that the free use requirement applied only to unimproved waterways. From an efficiency point of view, the ideal pricing scheme would equal marginal social benefits and costs. Equity under this scheme would also be enhanced since beneficiaries would pay according to the benefits received and the costs imposed. Advantages and disadvantages of three fee levels are considered: marginal cost pricing, average total cost pricing, and average variable cost pricing. Four specific user fee procedures were also evaluated: fuel tax, segmented tolls, license fees and lock congestion fees. A segment toll equal to average cost (STAC) and a STAC plus congestion fee were recommended for existing waterways with and without congestion. For new waterways, a STAC plus license fee and a STAC, license fee and congestion fee were recommended respectively. (Schroeder-Wisconsin)
W75-02661

COSTS OF CONSTRUCTION OF PUBLICLY-OWNED WASTEWATER TREATMENT WORKS. 1973 'NEEDS' SURVEY.
Environmental Protection Agency, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-226 962, $4.25 in paper copy, $2.25 in microfiche. Report to the Congress, Prepared Pursuant to Sections 205 and 516, Public Law 92-500, 1973. 14 p, 4 tab.

Descriptors: *Surveys, *Construction costs, *Treatment facilities, *Sewers, Municipal wastes, Federal Water Pollution Control Act, Grants, Federal project policy, Cost allocation, Costs, Engineering structures, Waste water treatment.

In conformance with Section 516(b) (2) of the 1972 Act, the 1973 Survey asked local authorities to report the costs for construction of municipal treatment and collection facilities which were eligible for Federal funding under the 1972 Act and the guidelines published by the Environmental Protection Agency for construction grants, and which met definitions and criteria established in the survey and outlined herein. Costs were reported for facilities in five categories, two for treatment and three for sewer systems. The limitations of the survey as well as survey results and possible allocation formulae are presented. (Sandoski-FIRL)
W75-02704

6D. Water Demand

URBAN WATER USE IN AUSTRALIA,
Gutteridge, Haskins and Davey Pty Ltd., Melbourne (Australia).
For primary bibliographic entry see Field 3D.
W75-02381

WATER RESOURCES ACTIVITIES IN TAIWAN, REPUBLIC OF CHINA,
Taiwan Water Resources Planning Commission. Taipei.
For primary bibliographic entry see Field 2A.
W75-02445

WATER RESOURCES DEVELOPMENT IN IRAN,
Ministry of Water and Power, Tehran (Iran).
For primary bibliographic entry see Field 2A.
W75-02452

WATER RESOURCES ACTIVITIES IN NORWAY,
Norwegian Water Resources and Electricity Board, Oslo. Water Resources Div.
For primary bibliographic entry see Field 2A.
W75-02460

THE ROLE OF HYDROLOGY IN ECONOMIC AND SOCIAL DEVELOPMENT, (ROL GIDROLOGII V EKONOMICHESIKOM. I. SOTSIALNOM RAZVITII),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2A.
W75-02479

ECTOCOMMENSALS AND PARASITES OF SHRIMP FROM TEXAS REARING PONDS,
Texas A and M Univ., College Station. Dept. of Wildlife and Fisheries Science; and Texas Agricultural Extension Service, College Station.
S. K. Johnson.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10455, $3.75 in paper copy, $2.25 in microfiche. Sea Grant Report TAMU-SC-74-207, January 1974. 19 p, 1 tab, 10 fig.

Descriptors: *Fish management, *Shrimp, *Parasitism, Fisheries, Texas, Commercial fishing, Fish diseases, Animal pathology, Fish parasites, Agriculture, Aquiculture.
Identifiers: Brazoria County(Tex).

The occurrence of ectocommensals and parasites within five species of penaeid shrimp and one palemonid shrimp in Texas coastal rearing ponds during 1972-73 period is surveyed. The Brazoria County test facility surveyed, consists of twenty 0.2 ha ponds having an average depth of one meter. Materials were obtained from formalin-preserved field samples taken throughout the growing season by project biologists. A specimen of each shrimp was selected from each weekly sample and subsequently examined. Shrimp taken from these ponds in 1972 included P. aztecus, P. occidentalis, P. vannamei, and Penaeus setiferus. In 1973 the latter shrimp were taken. In 1973 specimens of the last two varieties were also taken from three ponds in Corpus Christi. Examination procedures consisted of clipping and subsequent wet mount preparation of several pleopods and the distal portion of a uropod. The intestine was also removed. Results indicate that zoothamnium, epistylis and acineta ectocommensal and filamentous bacteria occurred relatively frequently on penaeid. Lagenophrys occurred less frequently. Nematopsis peneai, usually in a small trophozoite state were commonly found in the intestine. Results of a number of other studies concerning ectocommensals and parasites are also compared. (Schroeder-Wisconsin)
W75-02613

FACTORS RELATED TO BEACH USE,
Rhode Island Univ., Kingston. Agricultural Experiment Station.
I. A. Spaulding.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10588, $3.25 in paper copy, $2.25 in microfiche. Marine Technical Report Series, No 13, 1973. 20 p, 27 tab.

Descriptors: *Recreation, *Beaches, Attitudes, Recreation demand, Rhode Island.
Identifiers: Sand Beach(RI).

Results of a 1972 survey of user characteristics for Rhode Island's relatively isolated Sand Beach are presented. Data were collected on 31 successive days in July in 400 interviews with beach users. Users ranged in age from less than one to 79 with the average age between twenty and twenty-two years. Users tended to come to the beach in groups; 52.8% were families. Friendship groups accounted for almost half of the nonfamily groups. 53.5% of these contained both males and females. 90% of the respondents took part in other summer activities besides beach outings. Most of the individuals were residents of either Rhode Island or Connecticut. Most users traveled either less than 12 miles or between 28-42 miles to enjoy the beach. People tended to come because Sand Beach was not crowded and they engaged primarily in passive, restful beach activities. Users listed the beach's solitude, natural characteristics and sensory experiences as major benefits. Users disliked parking problems and limited beach physical characteristics. (Schroeder-Wisconsin)
W75-02614

WATER RECREATIONAL ACTIVITIES IN NEW YORK STATE AND THE EFFECT ON ASSOCIATED INDUSTRIES,
Cornell Univ., Ithaca, N.Y. Agricultural Experiment Station.
J. D. Francis, and L. Busch.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10149, $3.25 in paper copy, $2.25 in microfiche. New York's Food and Life Sciences Bulletin, No 31, August 1973. Social Sciences, No 3. 3 tab, 9 fig, 23 ref. NOAA 2-34281.

Descriptors: *Recreation demand, *Water sports, Fisheries, New York, Boating, Economic impact, Projections, Regional economics, Employment.

Projected trends to 1975 in recreational boating, sport fishing, and their accompanying associated industries for New York State are discussed. Boating certificates between 1960 and 1970 experienced an increase of 322,000 with comparable growth for documented yachts. This number underrepresents the total expansion of pleasure boating since no records are kept for nonpowered craft. Including such craft, tabulations double; and projecting to 1975, approximately 900,000 craft will be operating. Changes by craft size and geographic distribution are also presented. An associated industry, boat building and repairs, dropped approximately three firms per year between 1961-1971, but expected new businesses reduce the deficit to approximately seven firms, realizing a general decreasing demand for boats. Related areas of employment are in a comparable decline. Only a slight increase in marine facilities is foreseen, evidenced by a drop in boat sales and leveling off of registrations. The second major area of water recreation examined is sport fishing. Using issuance of fishing and combination licenses as an index of activity, there is a general upward trend. Fish preserves, an associated industry, will probably experience an increase in business, but the effect on employment in this industry will be negligible. (Schroeder-Wisconsin)
W75-02620

QUALITY RELATED COSTS OF REGIONAL WATER USERS,
Water Resources Engineers, Inc., Walnut Creek, Calif.
M. B. Sonnen.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY10, p 1849-1864, October 1973. 8 tab, 3 fig, 8 ref.

Descriptors: *Demineralization, Water treatment, Water softening, Water quality, Cost comparisons, Hardness(Water).
Identifiers: *Softening.

Domestic and industrial user costs resulting from dissolved solids and hardness concentrations are compared with costs of applicable water and waste treatment processes. Certain penalties are borne by water users during their routine operations because mineral levels exceeded acceptable limits. These costs include purchase of extra water by agriculture to be used to leach damaging salts from crop root zones; consumer purchase of excess cleaning products, bottled water and replacement of water heaters, appliances and plumbing; and purchase of blow-down water by industries for boilers or cooling towers in which salts are building up rapidly. A number of equations relating each of these costs to water quality are summarized. Cost relationships for treatment processes installed or chemicals added by homeowners or industries are also presented. Three sources of industrial treatment are considered: large-scale softening plants for cooling or processing waters; demineralization for some boiler works; or addition of chemicals to inhibit corrosion or scaling. Cost comparisons of treatment costs and consumer penalties are illustrated utilizing data from the Santa Ana Watershed in California. Results indicate that consumer quality costs are high and may easily justify advanced water and waste treatment facilities to reduce them. (Schroeder-Wisconsin)
W75-02627

BOSTON TO BROWNSVILLE,
Office of the Chief of Engineers (Army), Washington, D.C. Presentations Branch.
S. Reitman.
Water Spectrum, Vol 5, No 2, p 37-43, 1973.

Descriptors: *Water resources development, *Channels, Transportation, Federal government, Administration, Management, State governments, Gulf of Mexico, Atlantic Ocean, Navigation.
Identifiers: Gulf Intracoastal Canal Association.

A historical and futuristic overview of the Atlantic and Gulf Intracoastal Waterways is developed. The waterways, composed of 3,000 miles of interrupted navigable channels stretching between Boston Harbor and Brownsville, Texas provides users with bypasses to treacherous offshore hazards and less time consuming routes. Historically, many of the Atlantic waterways began as private or state ventures, taken over by the federal government as the maintenance costs grew and ship widths and drafts increased, requiring channel enlargements. Unlike the Atlantic piecemeal growth pattern, the sustaining force behind the birth and growth of the Gulf section was the Gulf Intracoastal Canal Association, created in 1905. Changing environmental outlooks have had an increasing effect on the growth and maintenance of the intracoastal waterways. Displeasure over the handling of dredge spoils, the consternation over the destruction of rare bird feeding and nesting areas, and increased concern over pollution have led to changes in many of the waterways' management policies. Any overall planning program, however, is complicated by complex state and federal jurisdiction problems. (Schroeder-Wisconsin)
W75-02639

RECREATION SURGE,
Office of the Chief of Engineers (Army), Washington, D.C. Civil Works Planning Div.
J. W. Morris.
Water Spectrum, Vol 5, No 2, p 14-23, 1973.

Descriptors: *Recreation, *Recreation demand, *Water resources development, Use rates, Government finance, Water policy, Planning, Legislation.
Identifiers: *Corps of Engineers, Flood Control Act of 1944, 1962 Amendment to the Flood Control Act of 1944, Federal Water Project Recreational Act of 1965, National Environmental Policy Act of 1969, Fish and Wildlife Coordinating Act.

Growing national recreational demand and legislative changes have provided tremendous challenges to the Corps of Engineers in the provision of outdoor recreational facilities. Over the past 20 years, recreation at Corps-built lakes has increased 17 fold, twice as fast as the number of lakes. The increasing demands on Corps-built lakes represents only a part of the nation's demand for recreation. This has been reflected in Congress by its consideration of recreational appropriations as both economic investments and environmental preservation devices. A review of past legislative and administrative actions reveals a trend. First recreation was recognized as an acceptable project purpose; encouraged because of its social and economic values. Laws then were passed to pro-

tect the environment to insure that all future generations have equal opportunity for the same type of experience. Recent laws have sought to implement user fees to offset the cost of operation, maintenance, and improvements. The management chores of the Corps are two fold: recreational management and resource management. Often such tasks are conflicting, but the Corps attempts to achieve an integrated approach over resource management through a multiple discipline methodology. (Schroeder-Wisconsin)
W75-02641

MEETING WATER DEMANDS IN THE BUNKER HILL - SAN TIMOTEO AREA,
California State Dept. of Water Resources, Sacramento.
Bulletin No 104-5, December 1970. 83 p. 31 fig, 33 tab, 11 ref.

Descriptors: *Water sources, *Water supply development, *Water management, Imported Water, Cost analysis, Water demand, Water delivery, Groundwater, Surface waters, Hydrology, California.
Identifiers: *Bunker Hill--San Timoteo(Calif).

A wide range of alternative plans to manage California's Bunker Hill - San Timoteo Area's groundwater supplies in coordination with surface water supplies and facilities to meet future water demand are investigated. A detailed study of the geology and hydrology of the area indicates that 5.5 million acre-feet of water was stored in 1965. Future replenishment to the groundwater from all sources including effluent percolation will average annually about 174,000 acre-feet under mean hydrologic conditions. Presently no water is being imported into the area, although as early as 1972 contracted State Water Project water will be brought in. Project demand in the area will rise from 149.0 thousand acre-ft in 1965 to 26.2 thousand acre-ft in 2015; with population tripling in the area over the same period. Plans to meet future demands are suggested varying in the amount and location of extractions; amount and location of artificial charges; level of diversion from Mill Creek, and the amount of direct delivery. A cost analysis of the present value of variable costs including water costs, treatment costs, pumping costs and laterals, indicates that costs vary from $40-48 million. Maximum groundwater extraction under all plans was 30 percent of the total. Existing and proposed facilities are described. (Schroeder-Wisconsin)
W75-02656

PLANNING AND CONTROL OF COMBINED SEWERAGE SYSTEMS,
San Francisco City and County Dept. of Public Works, Calif.
For primary bibliographic entry see Field 6A.
W75-02697

6E. Water Law and Institutions

LEGISLATION CONTROLLING WASTE DISPOSAL,
Essex River Authority (England).
For primary bibliographic entry see Field 5G.
W75-02215

MAKING POLLUTION CONTROL EASIER: PART 2 - WATER TREATMENT AND CONTROL,
General Electric Co., Schenectady, N.Y. Environmental Protection Operation.
For primary bibliographic entry see Field 5D.
W75-02233

SUPREME COURT UPHOLDS JUDGEMENTS IN HBI CASE,
For primary bibliographic entry see Field 5G.
W75-02275

IOWA WATER POLLUTION CONTROL COMMISSION,
Iowa State Dept. of Health, Des Moines.
For primary bibliographic entry see Field 5G.
W75-02341

WATER FOR THE HUMAN ENVIRONMENT, VOLUME II, COUNTRY REPORTS.
For primary bibliographic entry see Field 2A.
W75-02440

A SURVEY OF WATER RESOURCES DEVELOPMENT, UTILIZATION AND MANAGEMENT IN ISRAEL,
Ministry of Agriculture, Jerusalem (Israel). Hydrological Service.
For primary bibliographic entry see Field 2A.
W75-02454

AUSTRALIAN WATER QUALITY: PROBLEMS AND POLICY,
Caulfield Inst. of Tech. (Australia).
For primary bibliographic entry see Field 5G.
W75-02458

REPORT ON WATER RESOURCES ACTIVITIES IN NEW ZEALAND,
Ministry of Works and Development, Christchurch (New Zealeand). Water and Soil Div.
For primary bibliographic entry see Field 2A.
W75-02459

RECLAMATION OF WATER RESOURCES IN PORTUGAL,
International Hydrological Decade, Lisbon (Portugal). Portuguese National Committee.
For primary bibliographic entry see Field 2A.
W75-02462

WATER RESOURCES, WATER USE AND WATER ADMINISTRATION IN SWEDEN,
International Hydrological Decade, Stockholm (Sweden). Swedish National Committee.
For primary bibliographic entry see Field 2A.
W75-02464

REVIEW OF WATER RESOURCES IN BRAZIL,
Universidade Federal do Rio Grande do Sul, Porto Alegre (Brazil). Hydraulic Research Inst.
For primary bibliographic entry see Field 2A.
W75-02467

NATIONAL REPORT ON THE STATUS OF CANADIAN WATER RESOURCES ACTIVITIES AND DEVELOPMENT,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2A.
W75-02468

STATUS OF WATER RESOURCES ACTIVITIES AND DEVELOPMENT IN THE UNITED STATES,
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 2A.
W75-02469

THREE CENTURIES OF SCIENTIFIC HYDROLOGY.
For primary bibliographic entry see Field 2A.
W75-02471

HYDROLOGY--A LOOK BACK AND A LOOK FORWARD,
United Nations Educational, Scientific and Cultural Organization, Paris (France). Div. of Water Sciences.
For primary bibliographic entry see Field 2A.
W75-02472

INAUGURATION OF UTILITY REGULATIONS IN IOWA: THE DAVENPORT WATER COMPANY CASE,
Memphis State Univ., Tenn. Dept. of Economics.
D. H. Ciscel.
Nebraska Journal of Economics and Business, Vol 13, No 2, p 51-61, 1974. 8 ref.

Descriptors: *Public utilities, *Property values, Regulation, Utilities, Iowa, Value engineering, Constitutional law, Economic impact.
Identifiers: Iowa State Commerce Commission.

While the Iowa State Commerce Commission in one of the first state regulatory bodies, it was not until 1963 that the Commission's regulatory power was extended to state public utilities. These utilities include public utilities furnishing gas or water piped distribution systems, electricity, and communication systems for compensation. The 1963 change gained widespread public and industry support, the latter reaction to the expense of negotiating with over 200 subdivisions to gain rate changes under the earlier situation. The regulated and regulators are often in conflict over the valuation of the utility's property upon which rates are set. While the public interest may seek a conservation valuation, corporate interests seek larger valuations and invoke 5th and 14th Amendment issues to protect their claim. Prior to the 1963 amendment, a 1957 case (Fort Dodge) adopted a contention that valuation was a constitutional question requiring use of a fair value rate base. In a 1966 water rate case, the ISCC rejected this base, using the original cost base, citing a 1966 Act. The State Supreme Court upheld the ISCC order noting the statute, and the newly injected administrative review. Thus, the court brought Iowa into conformity with national trend. (Schroeder-Wisconsin)
W75-02649

PORT DEVELOPMENT IN THE EUROPEAN ECONOMIC COMMUNITY,
Port of Rotterdam (Netherlands).
J. M. C. Hagenaar.
Water Spectrum, Vol 5, No 3, p 27-35, 1973.

Descriptors: *Harbors, *Foreign trade, *Planning, Transportation, International commissions, Europe.
Identifiers: Common Market, European Economic Community Treaty, Port.

Although the European Economic Community's treaty touches only slightly on the problems of coordinating sea transportation and its respective facilities, recent activities by different EEC bodies indicate a belief that a common seaport policy is essential in the long run. The Seifriz report, the Seefeld report, the activities of the advisory committee on transport affairs, the European Parliament, and recent activities of the EEC commission point to efforts underway to forge a common seaport policy. The myriad of port policies currently utilized by the member states France, United Kingdom, Netherlands, Belgium, West Germany, and Italy illustrate the difficulty of forming a common policy. Obstructions include differing historical developments; shared administrative powers between private interests, local governments, and national governments; and varying legal constraints which could hinder any attempt to negotiate in this area. Similarly the development of a common seaport policy may conflict with the nationalistic goals of industrialization, social harmonization, and regional development. Any future attempts to develop such a policy are not promising if individual member

states' port policies remain intact. (Schroeder-Wisconsin)
W75-02655

COSTS OF CONSTRUCTION OF PUBLICLY-OWNED WASTEWATER TREATMENT WORKS. 1973 'NEEDS' SURVEY.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6C.
W75-02704

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL ENGINEERING GLOSSARY.
Calspan Corp., Buffalo, N.Y.
439 p, 61 ref, 1st edition, 1974, L. K. Wang (Editor). Calspan G99-313.

Descriptors: *Environmental engineering, Water pollution control, Air pollution, Thermal pollution, Limnology, *Environmental sanitation, Water purification, Water resources, *Classification.
Identifiers: *Definitions, *Glossaries.

The field of environmental engineering and science is truly an inter-disciplinary effort, requiring an understanding of the interrelationships between many of the traditional scientific disciplines. An engineer working on environmental problems, regardless of his degree of specialization, must have sufficient knowledge of terminologies in allied fields to enable intelligent communication and joint effort. This concept has prompted Calspan Corporation to compile this up-to-date comprehensive glossary of over 3,800 environmental terms covering the areas of water pollution control, air pollution control, land pollution control, noise pollution control, thermal pollution control, environmental limnology, enviromental health, water purification, and water resources.
W75-02240

BIBLIOGRAPHY OF THE NEW YORK BIGHT, PART 1 - LIST OF CITATIONS.
National Oceanic and Atmospheric Administration, Rockville, Md. Office of Coastal Zone Management.
For primary bibliographic entry see Field 10C.
W75-02393

BIBLIOGRAPHY OF THE NEW YORK BIGHT, PART 2 - INDEXES.
National Oceanic and Atmospheric Administration, Rockville, Md. Office of Coastal Zone Management.
For primary bibliographic entry see Field 10C.
W75-02394

7. RESOURCES DATA

7A. Network Design

A GUIDE TO STATISTICAL METHODS FOR THE ANALYSIS OF SAMPLES OF BENTHIC INVERTEBRATES, (IN FRENCH),
Freshwater Biological Association, Ambleside (England).
For primary bibliographic entry see Field 2H.
W75-02517

7B. Data Acquition

CONSTRUCTION OF WELDED 'WET LOOP' THERMOCOUPLE PSYCHROMETER JUNCTIONS,
Illinois Univ., Urbana. Dept. of Horticulture.
L. A. Spomer.
Agron J. Vol 66, No 3, p 456-457, 1974, Illus.
Identifiers: *Instrumentation, *Measurement, Construction, *Psychrometers(Thermocouple), Performance, *Hydrometers.

The construction and performance of a welded wire, wet loop (Richards') thermocouple psychrometer measuring junction are described. (The thermocouple psychrometer technique is an indispensable tool for the study of plant and soil water relations). This junction is simpler to construct, not subject to the incomplete wetting error probable with previous designs, and more sensitive and stable than the silver ring junctions.--Copyright 1974, Biological Abstracts, Inc.
W75-02207

PORTABLE DEVICE TO MEASURE INDUSTRIAL WASTEWATER FLOW,
North Star Research and Development, Minneapolis, Minn.
For primary bibliographic entry see Field 5A.
W75-02213

SELF-CONTAINED SAMPLING AND MEASUREMENT SYSTEM FEATURES RESPIROMETER.
Robertshaw Controls Co., Richmond, Va.
For primary bibliographic entry see Field 5D.
W75-02225

MEASURING OPEN CHANNEL WASTEWATER FLOWS,
Leupold and Stevens, Inc., Beaverton, Oreg.
For primary bibliographic entry see Field 5A.
W75-02226

WATER POLLUTION SAMPLING, MONITORING AND ANALYSIS INSTRUMENTATION,
Newark Coll. of Engineering, N.J. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5A.
W75-02228

RADIOMETRY OF WATER TURBIDITY MEASUREMENTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W75-02365

LABORATORY EVALUATION OF DISSOLVED OXYGEN ANALYZERS,
Instrumentation Center, Washington, D.C.
For primary bibliographic entry see Field 5A.
W75-02368

ON THE DESIGN OF WARM FOG CLEARING EXPERIMENTS USING HYDGROSCOPIC TREATMENTS,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W75-02369

MEASUREMENT OF RAINFALL RATES BY LIDAR,
Wisconsin Univ., Madison. Dept. of Meteorology.
For primary bibliographic entry see Field 2B.
W75-02392

A TRACTOR-MOUNTED HYDRAULICALLY-OPERATED SOIL SAMPLER FOR RAPID SOIL CORING,
Texas A and M Univ., Lubbock. Agricultural Research and Extension Center.
D. M. Schickedanz, A. B. Onken, T. Cummings, and R. M. Jones.
Agronomy Journal, Vol 65, No 2, p 339-340, March-April, 1973. 2 fig.

Descriptors: *Core drilling, *Cores, Hydraulic equipment, Soil profiles, *Sampling.
Identifiers: *Soil samplers.

A tractor-mounted hydraulically-operated soil sampler has been developed that incorporates a number of features required for extensive soil sampling. Speed, adaptability, mobility, accessibility, and safety are advantages of this equipment which are not all sufficiently adequate in currently available models. (Skogerboe-Colorado State)
W75-02414

CONTROLLING AUTOMATED IRRIGATION WITH SOIL MATRIC POTENTIAL SENSOR,
Agricultural Research Service, Florence, S.C. Coastal Plains Soil and Water Conservation Research Center.
For primary bibliographic entry see Field 2G.
W75-02417

REMOTE SENSING OF FALLOW SOIL MOISTURE BY PHOTOGRAPHY AND INFRARED LINE SCANNER,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering.
For primary bibliographic entry see Field 2G.
W75-02424

AN ECONOMICAL HYDRAULIC WEIGHING EVAPOTRANSPIRATION TANK,
Agricultural Research Service, Morris, Minn.
For primary bibliographic entry see Field 2D.
W75-02427

HISTORICAL DEVELOPMENT OF HYDROMETRY,
Bayerische Landesstelle fuer Gewasserkunde, Munich (West Germany).
For primary bibliographic entry see Field 2A.
W75-02474

PROSPECTS OF HYDROMETRY IN THE LIGHT OF MODERN TECHNOLOGY,
Indian Standards Association, New Delhi. Technological Committee No 113.
For primary bibliographic entry see Field 2A.
W75-02475

USE OF A VENTURI METER FOR A DRIFT SAMPLER IN RUNNING WATER, (IN FRENCH),
Toulouse-3 Univ. (France). Laboratoire d'Hydrobiologie.
H. Decamps, H. Laville, and D. Trivellato.
Ann Limnol, 9(2): 177-182, 1973, Illus.

Descriptors: *Manometers, Sampling, Instrumentation, Running waters.
Identifiers: Drift sampler, Manometer, Venturi meter, Water.

A new drift sampler is described. It is possible, by means of a venturi tube and a differential manometer, to know the volume of water filtered. The conditions of utilization are specified.--Copyright 1974, Biological Abstracts, Inc.
W75-02516

THE IN SITU CHEMOSTAT- A SELF-CONTAINED CONTINUOUS CULTURING AND WATER SAMPLING SYSTEM,
Oklahoma Univ., Norman. Dept. of Zoology.
For primary bibliographic entry see Field 2H.
W75-02528

AN AUTOMATED METHOD FOR THE DETERMINATION OF ARSENIC AND ANTIMONY,
New Brunswick Univ., Fredericton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.

W75-02587

METHODS OF MEASURING AND COMPUTING FLOOD DISCHARGES,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W75-02673

TRANSPORT AND DISPERSION OF FLUORESCENT TRACER PARTICLES FOR THE DUNE-BED CONDITION,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W75-02675

TWO-TUBE METHOD FOR SCREENING WATER ISOLATES FOR SALMONELLA,
Environmental Protection Agency, Kansas City, Kans. Water Quality Lab.
For primary bibliographic entry see Field 5A.
W75-02713

A BOTTOM SAMPLER WHICH IS EASY TO MAKE,
Oslo Univ. (Norway). Dept. of Limnology.
D. Hongve.
Fauna (Oslo), Vol 25, No 4, p 281-283, 1972, Illus.
Identifiers: *Bottom sampler, *Sampling.

A new corer-type bottom sampler is described. The main advantage is that it is easy to make. No unusual tools are necessary.--Copyright 1973, Biological Abstracts, Inc.
W75-02743

A NEW PROCEDURE FOR DETERMINING THE METAL CONTENT OF COLOURLESS COMPLEXONATES,
Leeds Univ. (England). Dept. of Inorganic and Structural Chemistry.
For primary bibliographic entry see Field 5A.
W75-02744

7C. Evaluation, Processing and Publication

A MATHEMATICAL SIMULATION OF ENVIRONMENTAL CONTROL IN SWINE BUILDINGS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-02308

SIMULATION OF THE HYDROLOGIC CYCLE USING ATMOSPHERIC WATER VAPOR TRANSPORT DATA,
Connecticut Univ., Storrs.
For primary bibliographic entry see Field 2A.
W75-02346

A MODEL FOR A CLIMATOLOGY OF THE POTENTIAL OF ICE-PHASE MODIFICATION OF CONVECTIVE CLOUDS,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W75-02363

EVALUATION OF METHODS FOR ESTIMATING STREAM WATER QUALITY PARAMETERS IN A TRANSIENT MODEL FROM STOCHASTIC DATA,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
K. P. Radha Krishnan, J. J. Lizcano, L. E. Erickson, and L. T. Fan.
Water Resources Bulletin, Vol 10, No 5, p 899-913, October 1974. 7 fig, 8 tab, 15 ref. OWRR B-021-KAN(9).

Descriptors: *Biochemical oxygen demand, *Computer models, *Computer programs, *Mathematical models, *Stochastic processes, Equations, Model studies, Water quality, Streams.
Identifiers: Bard's method, Simplex search method, Transient model.

Two parameters of biochemical oxygen demand were estimated in water quality models represented by linear first order partial differential equations. One parameter combined the rate processes for biochemical oxygen demand decay due to bacterial oxidation and to sedimentation. The other represented system time-lag. Two sets of simulated input-output data, one with input noise and the other with output measurement error, were used. The parameters were estimated by a gradient technique (Bard's method) and a pattern search technique (Simplex search method). The results indicate that the output measurement error significantly affects the values of parameter estimates as compared to the noise added to the input. Bard's method consistently gave results with a smaller sum of square value. The Simplex search method was computationally faster than Bard's method. (Harmeson-ISWS)
W75-02375

STATISTICAL ANALYSIS OF DAILY WATER QUALITY DATA,
Rutgers--The State Univ., New Brunswick, N.J. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W75-02376

DATA COLLECTION SYSTEMS AND THEIR IMPACT ON THE FUTURE DEVELOPMENT OF HYDROLOGY,
Department of the Environment, Reading (England). Water Data Unit.
For primary bibliographic entry see Field 2A.
W75-02476

TRENDS IN HYDROLOGICAL ANALYSIS,
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 2A.
W75-02477

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PART 1. NORTH ATLANTIC SLOPE BASINS,
Geological Survey, Reston, Va.
Available from Sup Doc., GPO, Washington, D.C. 20402 Price $3.30. Water-Supply Paper 2141, 1974. 449 p, 1 fig, 40 ref.

Descriptors: *Water quality, *Basic data collections, United States, Hydrologic data, Solutes, Water chemistry, Water temperature, Turbidity.
Identifiers: *Eastern U.S.

Records are presented of chemical analysis, water temperature, and suspended sediment of surface waters of the North Atlantic Slope basins of the U.S. as a basis for determining the suitability of waters for various uses. The records are listed by drainage basins in a downstream direction along the main stream. As an added means of identification, a station number has been assigned for each stream location where regular measurements of water quantity or quality have been made. Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses. During the water year ending September 30, 1969, the Geological Survey maintained 176 stations on 115 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 130 of these locations for chemical-quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 72 and daily at 29 stations. (Knapp-USGS)
W75-02482

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PARTS 4 AND 5. ST. LAWRENCE RIVER BASIN AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS,
Geological Survey, Reston, Va.
Available from Sup Doc, GPO, Washington, D.C. 20402 Price $2.80. Water-Supply Paper 2144, 1974. 367 p, 1 fig, 40 ref.

Descriptors: *Water quality, *Mississippi River basin, *St. Lawrence River, *Basic data collections, Hydrologic data, Sediment load, Solutes, Water pollution, Water chemistry, Water analysis, Surface waters.
Identifiers: *Hudson Bay drainage basin.

Records of chemical analysis, water temperature, and suspended sediment of surface waters are given for the St. Lawrence, Hudson Bay, and upper Mississippi basins as a basis for determining the suitability of waters for various uses. The flow and water quality of a stream are related to variations in rainfall and other forms of precipitation. In general, lower concentrations of dissolved solids may be expected during periods of high flow than during periods of low flow. Conversely, the suspended solids in some streams may change materially with relatively small variations in flow, whereas for other streams the quality of the water may remain relatively uniform throughout large ranges in discharge. The records are listed by drainage basins in a downstream direction along the main stream. Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses. During the water year ending September 30, 1969, the Geological Survey maintained 124 stations on 88 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 68 of these locations for chemical-quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 69 and daily at 24 stations. Specific conductance is determined and reported for almost all daily samples. (Knapp-USGS)
W75-02483

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA,
Geological Survey, Reston, Va.
Available from Sup Doc, GPO, Washington, D.C. 20402 Price $2.70. Water-Supply Paper 2149, 1974. 349 p, 1 fig, 40 ref.

Descriptors: *Water quality, *California, *Basic data collections, Hydrologic data, Sediment load, Solutes, Water pollution, Water chemistry, Water analysis, Surface waters.

Records of chemical analysis, water temperature, and suspended sediment of surface waters are given for Pacific slope basins in California as a basis for determining the suitability of waters for various uses. The flow and water quality of a stream are related to variations in rainfall and other forms of precipitation. In general, lower concentrations of dissolved solids may be expected

during periods of high flow than during periods of low flow. Conversely, the suspended solids in some streams may change materially with relatively small variations in flow, whereas for other streams the quality of the water may remain relatively uniform throughout large ranges in discharge. The records are listed by drainage basins in a downstream direction along the main stream. Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses. During the water year ending September 30, 1969, the Geological Survey maintained 188 stations on 129 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 84 of these locations for chemical-quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 115 and daily at 28 stations. Specific conductance is determined and reported for almost all daily samples. (Knapp-USGS)
W75-02484

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PARTS 12-16. NORTH PACIFIC SLOPE BASINS, ALASKA, HAWAII, AND OTHER PACIFIC AREAS,
Geological Survey, Reston, Va.
Available from Sup Doc, GPO, Washington, D.C. 20402 Price $3.50. Water-Supply Paper 2150, 1974. 480 p, 1 fig, 40 ref.

Descriptors: *Water quality, *Basic data collections, *Pacific northwest US, *Alaska, Sampling, Hydrologic data, Solutes, Water chemistry, Water temperature, Turbidity, *Hawaii.

Records are presented of chemical analysis, water temperature, and suspended sediment of surface waters of the Western U.S. as a basis for determining the suitability of waters for various uses. The records are listed by drainage basins in a downstream direction along the main stream. As an added means of identification, a station number has been assigned for each stream location where regular measurements of water quantity or quality have been made. Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling stations are included in most tables of analyses. During the water year ending September 30, 1969, the Geological Survey maintained 261 stations on 182 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 120 of these locations for chemical-quality studies. Samples were also collected less frequently at many other points. Water temperatures were measured continuously at 140 and daily at 23 stations. (Knapp-USGS)
W75-02485

INDEX OF FLOOD MAPS PREPARED BY U.S. GEOLOGICAL SURVEY THROUGH 1973,
Geological Survey, Reston, va.
P. H. Carrigan, Jr.
Water-Resources Investigations 57-73, April 1974. 332 p.

Descriptors: *Floods, *Maps, *Mapping, *Flood data, Information exchange, Documentation, Information retrieval, Publications, *Computer programs.
Identifiers: *Flood maps.

Flood maps prepared by the U.S. Geological Survey through 1973 are listed. Maps are listed by State and county, and information is given on the type of flooding and the reliability of the delineation. The list was prepared from a computer file, and an available program allows retrieval of data by land-line location, State and county, and Standard Metropolitan Statistical Area (SMSA). The file is continuously updated. (Knapp-USGS)
W75-02486

THE QUALITY OF SURFACE WATERS IN TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 5B.
W75-02488

RECONNAISSANCE INVESTIGATION OF GROUND WATER IN THE RIO GRANDE DRAINAGE BASIN--WITH SPECIAL EMPHASIS ON SALINE GROUND-WATER RESOURCES,
Geological Survey, Reston, Va.
T. E. Kelly.
For sale by USGS, 1200 S. Eads St., Arlington, Va, 22202 Price $1.50 per set. Hydrologic Investigations Atlas HA-510, 1974. 4 sheets, 14 maps, 47 ref.

Descriptors: *Hydrogeology, *Rio Grande River, *Colorado, *New Mexico, *Texas, Alluvial channels, Alluvium, Aquifers, Surface-groundwater relationships, Brines, Water quality, Water chemistry, *Maps, *Saline water.

The surface-water resources of the Rio Grande drainage basin, Colorado, New Mexico, and Texas, are insufficient to meet present needs in most of the basin. Groundwater supplies have been extensively developed for irrigation and for municipalities. In areas of heavy groundwater use, withdrawals often substantially exceed annual recharge; therefore the groundwater in storage is being depleted steadily, with accompanying deterioration in quality. Groundwater in the Rio Grande basin can be divided into two major quality types: freshwater which generally is near the surface, and the more deeply buried saline water. Freshwater is present in significant quantities in most of the Rio Grande basin in Colorado and New Mexico, and in parts of west Texas. The greatest thickness of the freshwater aquifer is present in the San Luis structural basin of Colorado. Throughout this entire basin the water table generally is less than 12 feet below the land surface. The middle basin area is characterized by well lithified Paleozoic rocks. Limestone is the major lithology. Throughout most of this area freshwater is present in the thin alluvial deposits of the river valleys; in other aquifers the water ranges in quality from slightly saline to brine. The lower basin region is similar to the middle basins, but the rocks generally are Mesozoic in age and the groundwater is less highly mineralized. The major aquifers in the region are limestone and marl of Cretaceous age which generally yield freshwater to wells at shallow depths and slightly to moderately saline water to deeper wells. (Knapp-USGS)
W75-02489

WATER-LEVEL CHANGES IN WEST-CENTRAL KANSAS, 1950-74,
Geological Survey, Garden City, Kans.
For primary bibliographic entry see Field 4B.
W75-02490

COMPILATION OF STREAMFLOW RECORDS, HELMAND RIVER VALLEY AND ADJACENT AREAS, AFGHANISTAN, 1961-68,
Geological Survey, Tucson, Ariz.
D. Childers.
Open-file report, May 1974. 144 p, 6 fig, 1 plate, 2 tab, 10 ref.

Descriptors: *Streamflow, *Basic data collections, *Hydrologic data, Water measurement, Discharge measurement, Sedimentation, Floods, Water yield.
Identifiers: *Afghanistan(Helmand River Valley).

Streamflow records are compiled for 36 gaging stations in central and southwestern Afghanistan. Daily flows are given for the water years 1961-68 for 33 of the stations; monthly and yearly discharge summaries of the years prior to 1961 for 18 stations; and maximum discharges for the period of record at each gaging station. Factors affecting streamflow within the study area include the physical setting, climatic characteristics, and traditional land-use practices. Problems related to land-use practices are accelerated sedimentation and erosion, aggravated flood hazards, and the effects on magnitude of flood peaks. As floodwaves move downstream small flood peaks may be diminished by canal diversion, whereas large flood peaks may not be significantly reduced. (Knapp-USGS)
W75-02491

WATER WELLS AND SPRINGS IN THE EASTERN PART OF THE UPPER SANTA MARGARITA WATERSHED, RIVERSIDE AND SAN DIEGO COUNTIES, CALIFORNIA,
Geological Survey, Garden Grove, Calif.
For primary bibliographic entry see Field 4B.
W75-02492

GROUND-WATER LEVELS IN WYOMING, 1972-1973,
Geological Survey, Cheyenne, Wyo.
B. H. Ringen.
Wyoming State Water Planning Program Report No 13, Supplement No 1, 1974. 158 p, 21 fig, 2 ref.

Descriptors: *Water levels, *Water wells, *Wyoming, Basic data collections, *Hydrologic data, *Groundwater, *Data collections.

Groundwater levels measured in 1972 and 1973 in the State of Wyoming are listed. Generally, water-level measurements listed are for wells with a sufficient number of measurements to show a trend in fluctuations. Short-term records, generally less than 5 measurements, are not included. (Knapp-USGS)
W75-02494

INVESTIGATION OF SEDIMENT TRANSPORT CURVES CONSTRUCTED USING PERIODIC AND APERIODIC SAMPLES,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W75-02674

COMPUTER SIMULATION OF SOLUTE CONCENTRATIONS AND LOADS IN STREAMS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5B.
W75-02677

8. ENGINEERING WORKS

8A. Structures

ROYAL SEND-OFF FOR SEVERN SCHEME.
For primary bibliographic entry see Field 5F.
W75-02209

STANDARDIZED HARDWARE FOR OIL SPILL CONTAINMENT BOOMS,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.

F. J. Campbell.
Available from the National Technical Information Service, Springfield, Va. 22161 as AD-781 645, $5.75 in paper copy, $2.25 in microfiche. Technical Report TN-1343, June 1974. 49 p, 24 fig, 3 tab, 5 ref, 2 append.

Descriptors: *Oil spills, Equipment, Laboratory tests, Testing, On-site tests, Design criteria, Evaluation, Design.
Identifiers: *Hardware, Boom connectors, Towing assembly, Boom-bulkhead attachment, *Booms(Containment).

The design, development, and testing of standardized hardware for use with existing and new Navy oil spill containment booms were described. This hardware which consists of a boom connector, a towing assembly, and a boom-bulkhead attachment can be used to quickly interconnect and deploy a wide variety of manufactured oil booms. Oil leakage through the hinged areas of assembled connectors was insignificant. Fabrication drawings of the boom connector, towing assembly, and boom-bulkhead attachment were presented. (Humphreys-ISWS)
W75-02361

INVESTIGATING THE ENVIRONMENTAL IMPACT OF ENGINEERING PROJECTS,
Council for Scientific and Industrial Research, Pretoria (South Africa).
R. G. Noble.
Die Siviele Ingenieur in Suid-Afrika, Vol 16, No 2, p 77-78, February, 1974.

Descriptors: *Project planning, *Environmental engineering, Environmental control, Construction, Urbanization, Irrigation, Feasibility studies, Africa, Irrigation practices.
Identifiers: South Africa.

The theory involved in dam building, irrigation schemes, and urbanization is described briefly. Also the organized method of approach including both the aims of the project and the actual investigation is discussed. (Sandoski-FIRL)
W75-02564

ECONOMIC PIPE SIZING FOR GRAVITY SPRINKLER SYSTEMS,
Stellenbosch Univ., (South Africa).
For primary bibliographic entry see Field 6A.
W75-02625

LEAST COST DESIGN OF WATER MAIN SYSTEM IN SERIES,
University Coll., London (England).
A. K. Deb.
Technical Notes EE3, p 405-409, 3 tab, 1 fig, 3 ref.

Descriptors: *Cost analysis, *Pipelines, *Water distribution(Applied), Water supply, Water conveyance, Hazen-Williams equation, Mathematical model.
Identifiers: Least-cost.

A simplified approach to determine the least-cost design of water main systems connected in series is highlighted. The approach combines the Hazen-Williams equation for pipe flow and pipe costs. In the first, head loss is indicated as a function of length of pipe, flow rate, pipe diameter, Hazen-Williams' coefficient for function and pipe diameter parameters. The capital costs of pipeline including the cost of laying, jointing, labor, etc. is expressed as a function of diameter and length. Through a manipulation and consolidation of these equations once the hydraulic head loss of the system is known, and values are assigned to the appropriate constants and exponents, head losses in various pipes in the system can be calculated and the least cost size of pipe for different sections of the system can be obtained. The approach is illustrated for a system consisting of five pipes in a series with beginning available head of 70 m. and a minimum end head of 25 m. (Schroeder-Wisconsin)
W75-02651

ECONOMIC PIPE SIZING IN PUMPED IRRIGATION SYSTEMS,
Stellenbosch Univ. (South Africa). Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6A.
W75-02688

DRINKING WATER TREATMENT PLANT.
For primary bibliographic entry see Field 5F.
W75-02691

BIOLOGICAL DEGRADATION SEWAGE TREATMENT PLANT.
For primary bibliographic entry see Field 5D.
W75-02694

SLOTTED DRAIN IS DESIGNED FOR SAFETY,
Armco Steel Corp., Middletown, Ohio. Metal Products Div.
G. E. Morris.
Public Works, Vol 105, No 9, p 76-77, September, 1974.

Descriptors: *Pipes, *Design, Engineering structures, Highways, Drainage, Drain pipes, *Storm runoff, *Drains, Conduits, *Storm drains, Subsurface drains, Runoff, Surface runoff, Urban runoff, Safety.
Identifiers: Slotted drain.

Design engineers at the Armco Steel Corporation have produced a recessed drainage pipe with a continuous opening that is flush with a highway surface. This prevents ponding and sheeting of rainwater along roadways, and is both economical and safe. This Slotted Drain pipe is a welded-seam, helically corrugated steel pipe. Proper backfill material plus the fact that the pipe is installed in the firm foundation of a roadbed add to the structural integrity of the Slotted Drain. Applications include installation along median barriers of superelevated highways, installation next to curbs on residential streets, and use in paved parking lots and airport ramps. Tests showed that this drain does not freeze at temperatures as low as -45F and with its continuous operation, sheet flow is intercepted and disposed of before it can clog the pipe. (Prague-FIRL)
W75-02696

SCREENING MODEL FOR STORM WATER CONTROL,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W75-02699

CONDUIT WITH INTERNAL DRAIN,
Modine Mfg. Co., Racine, Wis.
H. D. Huggins.
Canadian Patent 953,287. Issued August 20, 1974. Patent Office Record, Vol 102, No 34, p 52, August 1974.

Descriptors: *Conduits, *Patents, *Drains, *Drainage, *Gravity, Equipment, Flow system.
Identifiers: Internal drains, Gravity drains.

An apparatus drains away a liquid from an interior wall surface of a conduit by gravity flow. The conduit has located within it a capillary drain with spaced gravity drain portions, each of a small cross sectional area in contact with the wall surface at spaced locations. The portions are sloped so as to provide gravity drain away from the surface. Liquid condensate will be drawn by gravity capillary flow down the conduit wall, contacting portions to an intermediate portion. From there it is conducted down out of contact with the wall surface and the condensate will not interfere with heat transfer through the conduit wall. (Prague-FIRL)
W75-02703

COSTS OF CONSTRUCTION OF PUBLICLY-OWNED WASTEWATER TREATMENT WORKS. 1973 'NEEDS' SURVEY.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6C.
W75-02704

8B. Hydraulics

ON THE QUESTION OF NON-UNIQUENESS OF INTERNAL HYDRAULIC JUMPS AND DROPS IN A TWO-FLUID SYSTEM,
California Univ., Los Angeles. Dept. of Mechanics and Structures.
S. C. Mehrotra, and R. E. Kelly.
Tellus, Vol 25, No 6, p 560-567, 1973. 9 fig, 6 ref. NSF Grant GA-31247X.

Descriptors: *Hydraulic jump, *Froude number, *Internal waves, Momentum equation, Energy equation, Critical flow, Density, Analysis, Hydraulics, Fluid mechanics, Flow characteristics.
Identifiers: *Internal shocks, *Conjugate states, *Confined flow, Two-layer flow, Supercritical regime, Subcritical regime, Boussinesq fluids.

The conjugate states for a given two-layer flow of stable configuration confined on top and bottom by horizontal walls were studied. Energy considerations showed the possibility of at most two such states. Uniqueness was established by studying the total problem which included the agency (a hump or contraction) responsible for causing the shocks. By determining a suitable correspondence between the rigid top and the free surface for flows with purely internal shocks, the uniqueness of the conjugate state for the free surface case was also established. (Adams-ISWS)
W75-02378

DYNAMICS OF SMALL-SCALE OCEANIC FRONTS,
Connecticut Univ., Groton. Marine Sciences Inst.; and Connecticut Univ., Storrs. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2L.
W75-02385

NON-LINEAR WAVES IN THE NEARSHORE REGION: SHOALING AND SET-UP,
Institute of Oceanographic Sciences, Birkenhead (England).
For primary bibliographic entry see Field 2L.
W75-02386

THE SALT BALANCE IN STRATIFIED ESTUARIES,
Institute of Oceanographic Sciences, Taunton (England).
For primary bibliographic entry see Field 2L.
W75-02388

A NON-LINEAR THEORY OF LONGSHORE CURRENTS,
Institute of Oceanographic Sciences, Birkenhead (England).
For primary bibliographic entry see Field 2L.
W75-02390

SIMILITUDE CONDITIONS IN FREE-SURFACE VORTEX FORMATIONS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
L. L. Daggett, and G. H. Keulegan.
U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Miscellaneous Paper H-74-1, January 1974. 35 p, 15 fig, 2 tab, 2 append, 10 ref. (Sponsored by U.S. Army Research Office, Durham).

Descriptors: *Viscosity, *Surface tension, *Flow, *Vortices, Hydraulics, Fluids , Fluid mechanics, Testing.
Identifiers: *Similitude.

This report describes an investigation into the effects of fluid viscosity and surface tension on free-surface vortex flows and presents the results of this study. Experiments were conducted in two different sized cylindrical tanks with adjustable vanes at the perimetry to allow varying degrees of initial circulation to be generated at the entrance to the test section. Different fluids were used to investigate the effects of viscosity and surface tension on the incipient conditions for vortex formation and vortex size and shape. The investigation demonstrated that: (1) This type of flow is affected by viscosity and initial circulation, while surface tension, for the ranges tested, does not influence the flow; (2) The coefficient of discharge is a function of the Reynolds and circulation numbers; and (3) Regions in which an air core will form or will not form can be defined by the depth of flow, the orifice size, and the circulation and Reynolds numbers. (Authors)
W75-02569

NAVIGATION CHANNEL IMPROVEMENTS, BARNEGAT INLET, NEW JERSEY; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
R. A. Sager, and N. W. Hollyfield.
Available from NTIS, Springfield, Va 22161 as AD-778 191, $11.50 in paper copy, $2.25 in microfiche. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report H-74-1, March 1974. 454 p, 156 photo, 248 pl (Sponsored by U.S. Army Engineer District, Philadelphia).

Descriptors: *Channel improvement, *Hydraulic models, *Inlets(Waterways), Channels, New Jersey, *Jetties.
Identifiers: Barnegat Inlet(NJ), *Navigation channels.

The model study of Barnegat Inlet was conducted to evaluate the effectiveness of proposed plans of improvements to stabilize the size and location of the authorized navigation channel through the inlet. Tests were conducted in a fixed-bed model to define the effects of each stage of a multistage plan of improvement on the hydraulic characteristics of the inlet. The model was then converted to a movable-bed model, and the effects of the multistage plan of improvement on the movement of material were defined. The results of the tests indicated that the key to the improvement of navigation conditions in the inlet is a new south jetty to be constructed essentially parallel to the existing north jetty.
W75-02570

SOUTH ELLENVILLE FLOOD CONTROL PROJECT, RONDOUT CREEK BASIN, NEW YORK; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
E. S. Melsheimer.
Available from NTIS, Springfield, Va. 22161 as AD-778 716, $4.75 in paper copy, $2.25 in microfiche. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report H-74-2, April 1974. 80 p, 23 photo, 22 pl.

Descriptors: *Channel improvement, *Hydraulic models, *Hydraulic structures, New York, *Flood control, Channels.
Identifiers: *Rondout Creek Basin(NY), Sandburg Creek(NY).

Model investigations of the proposed channel improvements for flood control on North Gully and Sandburg Creek at South Ellenville, New York, were conducted to supplement and verify hydraulic computations for the original design and to develop alterations effecting improved hydraulic performance and reduced construction costs. A 1:20-scale model was used to verify and improve design features including the chute entrance, chute alignment, superelevation in bends, effect of large materials in the chute on flow disturbances in the chute, hydraulic performance of the stilling basin, wall heights, and elevation of bridges, and to determine the need for riprap protection below the stilling basin. Tests of the original design indicated flow conditions within the proposed chute to be generally satisfactory. However, unsatisfactory flow conditions were observed at the entrance to the high-velocity chute in North Gully. Improvements in flow conditions were effected by: (a) Installing a 7.25-ft-high weir at the entrance to the high-velocity chute; (b) Flattening the slope of the transition section upstream of the basin and modifying the parabolic drop entering the basin to provide a more vertical drop; (c) Increasing the height of the debris barrier to prevent passage of debris into the chute.
W75-02571

SPILLWAY CREST DESIGN,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
T. E. Murphy.
U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Miscellaneous Paper H-73-5, December 1973. 9 p, 1 tab, 3 pl, 3 ref.

Descriptors: *Spillway crests, *Spillways, Wiers.

The paper presents a method for design of the weir crest for any depth of approach or inclination of the upstream face of the spillway.
W75-02572

ESTIMATING AVERAGE SEDIMENT YIELDS FROM ANNUAL STREAMFLOW AND SEDIMENT RECORDS,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W75-02669

AN INVESTIGATION OF THE SUSPENDED LOAD TRANSPORT EFFICIENCY IN THE BAGNOLD EQUATION,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W75-02670

FLUME STUDIES WITH FINE AND COARSE SAND, A PRELIMINARY ANALYSIS,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W75-02671

STOCHASTIC CHARACTERISTICS OF PARTICLE MOVEMENT OVER A DUNE BED,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 2J.
W75-02672

METHODS OF MEASURING AND COMPUTING FLOOD DISCHARGES,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W75-02673

INVESTIGATION OF SEDIMENT TRANSPORT CURVES CONSTRUCTED USING PERIODIC AND APERIODIC SAMPLES,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W75-02674

TRANSPORT AND DISPERSION OF FLUORESCENT TRACER PARTICLES FOR THE DUNE-BED CONDITION,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W75-02675

GENERAL REPORT,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W75-02676

HYDRAULICS AND UNIFORMITY FOR DRIP IRRIGATION,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W75-02711

8C. Hydraulic Machinery

PUMPS FOR SEWAGE TREATMENT PROCESSES,
W. H. Sowden.
The International Technical Review, No 93, p 240-243, June, 1974. 7 fig.

Descriptors: *Pumps, *Pumping stations, *Design criteria, Sewage treatment, Sewage sludge, Water pumps, Flow measurement, Effluents, Safety factors, Sewage effluents, Waste disposal, *Sewage disposal.

A wide scope of biological and chemical treatments of sewage utilize pumps and pumping stations. Design features differ for pump impellers and casings. Services on which pumps must be used include: movement of untreated, coarse screened or comminuted sewage; storm water pumping; sludge transfer and sludge circulation services; water pumps for treated effluent pumping; and water pumps for high pressure effluent hosing. In a sewage pumping station, care is needed in the layout of pumps to avoid problems caused by suspended matter. Flow measurement, adequate ventilation, and precautions against hydraulic surges are dependent upon the type of plant requirements. Pump stations cover a range of a few cubic meters per day to nearly half a million cubic meters per day. Design features are becoming more specific according to the type of sewage treatment facility. (Prague-FIRL)
W75-02695

SUBMERSIBLE PUMPS IN THE SEWAGE SYSTEM,
Royal Inst. of Tech., Stockholm (Sweden).
H. Fries.
The International Technical Review, No 95, p 246-250, 1974. 8 fig, 8 ref.

Descriptors: *Pumps, *Sewage, *Equipment, *Pumping, Design criteria, Waste water treatment, Sewage treatment, Pumping stations, Automation, Cleansing, *Sewage disposal, Waste disposal, *Pumping plants.
Identifiers: *Treatment plants, Multipump stations, Model testing, Sewage pump systems, Sweden, Submersible pumps.

Choice of sewage pump types and design of pump stations are discussed, with the criteria depending on the type of treatment that the sewage will receive at the treatment plant. Too long a retention time in peripheric pump stations can give a septic

water that is hard to treat, especially in warm countries. Pumps should be sufficiently wear resistant to handle sand and gravel and should be designed for a mild action only if necessary for the pump function, so that the efficiency of automatic strainers at the treatment plant is not adversely affected. Small pump stations can be designed with tangential inlets and steeply sloping bottoms for optimum aeration and minimum cleansing demand. For large pump stations, however, model testing is necessary to determine the best inlet conditions to the pump. Multipump stations offer the possibility of equalized feeding of treatment plants, but must be equipped with not only step-wise start but also step-wise stop of the pumps. (Prague-FIRL)
W75-02698

8G. Materials

METHOD OF MAKING AND PIPELINE TRANSPORTING A NON-CORROSIVE SULPHUR-WATER SLURRY,
For primary bibliographic entry see Field 5D.
W75-02715

A PRECISE METHOD FOR THE GENERATION OF STANDARD METAL SALT PARTICULATES,
Louisiana State Univ., Baton Rouge. Dept. of Chemistry.
V. Dharmarajan, and P. W. West.
Analytica Chimica Acta, Vol 69, No 1, p 43-48, March, 1974. 1 fig, 3 tab, 2 ref. NSF (GI-35114X).

Descriptors: *Heavy metals, *Standards, *Air pollution, *Analytical techniques, Zinc, Lead, Oxides, Ions, Copper, Nickel, Cobalt, *Dusts, Oxides, Particle size, Pollutants, *Instrumentation.
Identifiers: Metal oxides, Dust generators.

A simple, stable and versatile dust generator was designed. The generator may be used to produce a single metal oxide species, or a mixture of metals may be converted to their respective oxides to produce a complex dust having any desired inter-metal ratio. The dust generated simulates the metal oxide dusts present in the ambient atmosphere both in composition and size. Preliminary studies of the particle size of the dust generated indicated that they fall in the size range of 0.1 micrometer to 5 micrometers, which includes the size range of respirable dusts. The generator consisted of an atomizer burner of the type used in commercial flame photometers. The atomizer burner is operated with an oxygen-acetylene flame. A dilute solution of the desired metal or mixture of metal salts is aspirated into the flame at a steady rate. The particulates thus generated are collected by means of a miniature stack and deposited on filter tapes. (Jernigan-Vanderbilt)
W75-02729

THE DETERMINATION OF COPPER IN SEA WATER BY ATOMIC ABSORPTION SPECTROMETRY WITH A GRAPHITE ATOMIZER AFTER ELUTION FROM CHITOSAN,
Bologna Univ. (Italy). Ciamician Chemical Inst.
For primary bibliographic entry see Field 5B.
W75-02730

THE ATOMIZATION OF METAL CHELATES IN CHLORINATED ORGANIC SOLVENTS IN FLAME SPECTROMETRY,
Ljubljana Univ. (Yugoslavia). Inst. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-02731

8I. Fisheries Engineering

METHOD FOR SIMULTANEOUS DETERMINATION AND IDENTIFICATION OF MS-222 AND METABOLITES IN FISH TISSUES,
Southeastern Fish Control Lab., Warm Springs, Ga.
For primary bibliographic entry see Field 5A.
W75-02261

RESIDUES OF MS-222, BENZOCAINE, AND THEIR METABOLITES IN STRIPED BASS FOLLOWING ANESTHESIA,
Southeastern Fish Control Lab., Warm Springs, Ga.
For primary bibliographic entry see Field 5A.
W75-02262

A STUDY OF THE CLAM, RANGIA CUNEATA, IN LAKE PONTCHARTRAIN AND LAKE MAUREPAS, LOUISIANA,
Louisiana Wild Life and Fisheries Commission, New Orleans.
J. W. Tarver, and R. J. Dugas.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-73-11046, $5.25 in paper copy, $2.25 in microfiche. Technical Bulletin No 5, February 1973. 32 fig, 35 tab, 48 ref, 1 append. NOAA 2-91-R.

Descriptors: *Commercial shellfish, *Clams, Louisiana, Estuaries, Salinity, Fisheries, Harvesting, Environmental effects, Distribution, Predation, Dredging, Mortality, Management, Industrial production.
Identifiers: *Rangia cuneata, Lake Pontchartrain(La), Lake Maurepas(La), Clam shell dredging, Overfishing.

The brackish-water clam, Rangia cuneata, is an abundant species inhabiting waterbottoms of low salinity estuaries in southern Louisiana. Even though the potential value of the meats far exceeds the shell value, the clam shell industry is important to Louisiana's economy. Eight major industrial users utilize shells in the manufacture of many products and as fill material in nearshore oil explorations. Clam and oyster shells represent south Louisiana's only ready source of calcium carbonate which is required in many chemical processes. Samples of Rangia cuneata were taken by utilizing a Peterson and modified oyster dredge throughout Lakes Pontchartrain and Maurepas to determine the occurrence, distribution and population density. Hydrological, sedimentological and plankton samples were analyzed in an effort to determine some of the factors affecting the distribution and density and growth of R. cuneata. Mortality and the effects of shell dredging operations on the environment are briefly discussed. Annual shell production and overfishing factors are discussed and management recommendations to sustain clam shell yield are also proposed. Data accumulated indicate that the largest clams were found at more saline stations and that reproduction, recruitment and growth were occurring. (Jones-Wisconsin)
W75-02264

REARING OF RAINBOW TROUT FINGERLINGS SALMO IRIDEUS AT TROUT FARMS OF THE WESTERN REGIONS OF THE UKRAINIAN SSR, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kiev (USSR).
P. T. Galasun.
Vopr Ikhtiol. 13(6): 1065-1073, Illus. 1973.

Descriptors: *Rainbow trout, *Fry, Fish farming, USSR, Fish stocking.

The effect of the duration of the rearing period, temperature regime and stocking density of fry in rearing ponds on the growth of rainbow trout fingerlings (S. irideus) was studied. The rearing results of fingerlings were recorded: average weight, percentage of yield from the number of fry stocked, fish productivity and food consumed during rearing. Devices for removing and grading the fingerlings are proposed.--Copyright 1974, Biological Abstracts, Inc.
W75-02600

BURBOT LOTA LOTA (L.) IN THE UPPER TULOMA RESERVOIR, (IN RUSSIAN),
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Kybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. A. Nelichnik.
Vopr Ikhtiol, Vol 13, No 6, p 1000-1007, Illus, 1973.

Descriptors: *Fish farming, USSR, Fish diseases.
Identifiers: *Burbot, Lota lota.

Data are presented on the distribution of the burbot (Lota, lota) in rivers and lakes in the Murmansk Oblast (Russian SFSR, USSR) and on the age, growth, fat content, feeding and infection (by Triaenophorus nodulosus) of burbot in the Upper Tuloma reservior. The burbot is 1 of the principal commercial fishes of the Upper Tuloma reservoir. The catch in 1971 reached 1469 centners, which was 54.7% of the total annual catch in the reservoir. The intensity of present-day fishery exceeds the optimal level, which leads to overfishing. But since the burbot has an adverse effect on the stock of valuable fishes the intensity of fishing can be left at the present level (1300-1500 centners).--Copyright 1974, Biological Abstracts, Inc.
W75-02601

DATA ON THE ECOLOGY OF THE NORTHERN PIKE ESOX LUCIUS L. OF THE LOWER UMBA RIVER, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Ichthyology.
M. S. Kamyshnaya, and E. A. Tsepkin.
Vopr Ikhtiol, Vol 13, No 6, p 1108-1111, Illus, 1973.

Descriptors: *Pikes, Fish hatcheries, USSR, Fish migration, Fish diets.
Identifiers: Esox, Oncorhynchus, Pike.

The article presents data collected in the summer of 1970 in the lower reaches of the Umba River in the region of the Umba fish hatchery (Murmansk district, Russian SFSR, USSR) which releases juvenile Atlantic salmon (Salmo salar) and pink salmon (Oncorhynchus gorbuscha), the pike (E. lucius) being caught downstream from the hatchery. The size of the pike, their age composition, growth rate, feeding habits and food composition are given. It is expedient to remove the pike below the site of releasing the salmon over a stretch of at least 1-1.5 km in order to increase their survival during downstream migration.--Copyright 1974, Biological Abstracts, Inc.
W75-02602

THE FEASIBILITY OF BRINE SHRIMP PRODUCTION ON CHRISTMAS ISLAND,
Hawaii Univ., Honolulu. Sea Grant Program.
P. Helfrich.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-73-11895, $7.00 in paper copy, $2.25 in microfiche. UNIHI-SEA GRANT-TR-73-02, July 1973. 173 p, 33 fig, 35 tab, 57 plates, 97 ref. NOAA GH-93 and 2-35243.

Descriptors: *Aquiculture, Cost analysis, Fish farming, Fish hatcheries, Fish management, Shrimp, Demand, Economic feasibility, Pacific Ocean.
Identifiers: *Artemia shrimp, Christmas Island.

The physical and economic feasibility of developing a brine shrimp egg industry on Christmas Island, in the equatorial Pacific, is evaluated. Detailed physiographic, biological, hydrolographic and geological studies undertaken on the Island indicate the high salinity F-series lakes could be induced to provide sufficient phytoplankton to sustain the industry. Because of the high value of Artemia shrimp eggs and the shrimp's amenability to high saline waters, the culture scheme devised provides specifically for their production. The culture system outlined involves utilization of hatchery tanks, phytoplankton production, and rearing and egg laying lakes under control management. Processing of the eggs would be undertaken almost exclusively on the Island with final packaging and grading to be undertaken at distributional centers. Cost estimates generated over a four year period to provide for an annual rate of production of 15,000 and 30,000 gallons respectively were $734,119 and $227,918 with total receipt expected to equal $1,050,000 and $1,750,000. Equipment and facility requirements and alternative aquacultural developments are also discussed. (Schroeder-Wisconsin)
W75-02623

MISSISSIPPI OYSTER CULTURE RESEARCH,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering.
W. H. Brown, C. D. Veal, and W. J. Demoran.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-74-10605, $3.25 in paper copy, $2.25 in microfiche. Sea Grant Publication No MSGP-72-001, 1972. 11 p, 1 fig, 5 ref, 1 append.

Descriptors: *Shellfish, *Oysters, *Commercial shellfish, Mississippi, Fish management, Agriculture.
Identifiers: Cultch.

During recent years oyster production areas of the Atlantic and Pacific Coasts have been threatened by pollution and competing uses. To compensate, the Department of Agricultural and Biological Engineering at Mississippi State University has begun to examine the potential development of a large scale support system to take advantage of off-bottom culture utilizing a high percentage of the water column. The system would be designed so that labor inputs would be minimized as an alternative to existing oyster production procedures, while at the same time emphasizing economic feasibility and aesthetic desirability. At present the first stage of the research is under way to find suitable artificial cultch materials; fabrication of two cultch test vessels were completed in August 1971. Results of cultch tests within Biloxi Bay for 48 materials are presented. Observation of the test vessels at approximately one month intervals failed to disclose any significant spat set on the cultch test specimens. Future research plans are also discussed. (Scroeder-Wisconsin)
W75-02624

KENTUCKY LAKE COMMERCIAL CATFISH CATCH ANALYSIS,
Murray State Univ., Kentucky. Biological Station.
For primary bibliographic entry see Field 6B.
W75-02632

ECONOMICS OF FISHERY MANAGEMENT,
Food and Agriculture Organization of the United Nations, Rome (Italy). Dept. of Fisheries.
J. A. Gulland, and M. A. Robinson.
Journal Fisheries Research Board of Canada, Vol 30, No 12, p 2042-2050, 1973. 3 ref.

Descriptors: *Fisheries, *Fish management, *Fish harvest, *Economic efficiency, Planning, Optimum development plans, Benefits, Size.

Because the fisheries represent a common property resource, fishing efforts tend to be inefficient, the result of a divergence of the marginal social and private costs and benefits. This divergence is due to external diseconomies created by the activities of one fisherman on the cost of catching fish by another. While the normal fishery might be expected to reach equilibrium around a break-even point, this equilibrium will generally represent greater harvesting levles and lower returns than would result if the fishery was exploited by a single firm. In addition, fishermen's investment decisions based on previous fishing successes rather than future projections, and their rush to profit from new technology, exacerbate overcapacity conditions. Once settled, labor and capital engaged in the industry is generally immobile, making capacity reduction politically difficult. Among many management objectives that may be chosen are: (1) how to achieve an efficient fishing level; (2) how to minimize economic disturbance resulting from attempts to reduce capacity; and, (3) how to distribute the total fishing level among nations. A number of measures which control the size of fish caught, the amount of fishing, and the equipment utilized are discussed in terms of their economic and political feasibility. (Schroeder-Wisconsin)
W75-02647

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

NATIONAL ENVIRONMENTAL POLICY SHIFTS: A CASE FOR ENGINEERING MANPOWER PLANNING,
For primary bibliographic entry see Field 6A.
W75-02552

9D. Grants, Contracts, and Research Act Allotments

COSTS OF CONSTRUCTION OF PUBLICLY-OWNED WASTEWATER TREATMENT WORKS. 1973 'NEEDS' SURVEY.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6C.
W75-02704

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

REPORT ON NINTH ANNUAL WATER RESOURCES RESEARCH CONFERENCE SPONSORED BY OFFICE OF WATER RESOURCES RESEARCH.
Office of Water Research and Technology, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-237 998, $7.25 in paper copy, $2.25 in microfiche. Proceedings of the 1974 conference, held in Washington, D.C., April 10-11, 1974. Published by OWRT, Department of the Interior, Washington, D.C., November 1974. 206 p.

Descriptors: *Planning, *Water Resources Research Act, *Allotments, *Water demand, *Energy, Universities, Research and development, State government, Federal budgets, Land use, Administrative decisions, *Research priorities, *Conferences, Federal project policy, US Water Resources Council, Water Resources Institute, Administrative agencies, Regional analysis.
Identifiers: *Title II of P.L. 88-379, *Research programs, *Research needs, Research administration.

This ninth annual conference on water resources research, sponsored by OWRT, featured talks by Federal and State officials, university personnel, and representatives of the private research sector involved in the water research and training program authorized by P.L. 88-379 as amended. Workshop sessions dealt with problems and recommendations concerning the administration of the program and with the reactions of the State Water Resources Research Institute Directors to the report of OWRR's special advisory panel. Research conducted under Title II of the Act is expected to focus more directly on water problems related to the mission of the Interior Department in the future. Some of the more pressing research needs, as seen by various Federal and state agencies, were summarized; the role of the private research sector in the P.L. 88-379 program was discussed; and suggestions were given on ways of developing research programs in close consultation with leading water officials and on conducting multidisciplinary research.
W75-02344

10C. Secondary Publication And Distribution

ENVIRONMENTAL ENGINEERING GLOSSARY.
Calspan Corp., Buffalo, N.Y.
For primary bibliographic entry see Field 6G.
W75-02240

BIBLIOGRAPHY OF THE NEW YORK BIGHT, PART 1 - LIST OF CITATIONS.
National Oceanic and Atmospheric Administration, Rockville, Md. Office of Coastal Zone Management.
Environmental Science Information Center, Environmental Data Service, Rockville, Maryland, January 1974. 184 p.

Descriptors: *Bibliographies, *Ecology, *Sea water, *Aquatic environment, Information retrieval, Documentation, Biology, Oceanography, Meteorology, Climatology, Geology, Social aspects, Administration, Air pollution, Water pollution, Solid wastes, Thermal pollution, Industries, Energy, Transportation, Fisheries, Recreation.
Identifiers: *New York Bight, Aquatic biology, Law, Mineral extraction.

Subject coverage of the bibliography included the following categories: (1) physical anb biological sciences, aquatic biology, oceanography (including physical, chemical, and dynamic aspects), meteorology and climatology, geology (including marine geology, solid earth geology, geomorphology, and groundwater hydrology); (2) social aspects, law, administration, and sociology (including population studies, urban studies, and social geography); (3) pollution, air pollution, water pollution, solid waste, and thermal pollution; and (4) industries, energy, mineral extraction, transportation, fisheries, and recreation. Although the bibliography topics are basically of a marine nature, special effort was devoted to include references on subjects related to the coastal zone of the New York Bight; for example, water resources of the area. Each citation consists of the title of the publication, names of authors, source of the publication (e.g., journal citation or technical report number), category number, a list of subject and geographic descriptors, and the citation identification number. (See also W75-02394) (Humphreys-ISWS)
W75-02393

BIBLIOGRAPHY OF THE NEW YORK BIGHT, PART 2 - INDEXES.
National Oceanic and Atmospheric Administration, Rockville, Md. Office of Coastal Zone Management.
Environmental Science Information Center, Environmental Data Service, Rockville, Maryland, January 1974. 493 p.

Descriptors: *Bibliographies, *Ecology, *Sea water, *Aquatic environment, Information retrieval, Documentation, Biology, Oceanography, Meterology, Climatology, Geology, Social aspects, Administration, Air pollution, Water pollution, Solid wastes, Thermal pollution, Industries, Energy, Transportation, Fisheries, Recreation.
Identifiers: *New York Bight, Aquatic biology, Law, Mineral extraction.

Part 2 contains author and subject indexes to aid in locating references of interest. Each index entry gives the author's name or subject (including geographic names), a list of titles of pertinent references and the associated reference identification numbers. Using the identification number, the full reference may be found in Bibliography of the New York Bight, Part 1 - List of Citations. Subject coverage included the following categories: (1) physical and biological sciences, aquatic biology, oceanography (including physical, chemical, and dynamic aspects), meteorology and climatology, geology (including marine geology, solid earth geology, geomorphology, and groundwater hydrology); (2) social aspects, law, administration, and sociology (including population studies, urban studies, and social geography); (3) pollution, air pollution, water pollution, solid waste, and thermal pollution; and (4) industries, energy, mineral extraction, transportation, fisheries, and recreation. Although the bibliography topics are basically of a marine nature, special effort was devoted to include references on subjects related to the coastal zone of the New York Bight; for example, water resources of the area. (See also W75-02393) (Humphreys-ISWS)
W75-02394

10F. Preparation Of Reviews

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For primary bibliographic entry see Field 05G.
W75-02553

ENVIRONMENT UPDATE,
For primary bibliographic entry see Field 06A.
W75-02554

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AQUATIC ENVIRONMENT
Bibliography of the New York Bight, Part 1 - List of Citations.
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W75-02394 10C

AQUATIC INSECTS
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W75-02592 2H

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Finite Element Weighted Residual Solution of One-Dimensional, Unsteady and Unsaturated Flows in Porous Media,
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CALSPAN CORP., BUFFALO, N.Y.
Environmental Engineering Glossary.
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CALSPAN CORP., BUFFALO, N.Y. ENVIRONMENTAL SYSTEMS DEPT.
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Limnological Studies on Freshwater Ponds of Hyderabad, India,
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Australian Water Quality: Problems and Policy,
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Effects of Varying Degrees of Water Restriction on the Distribution of Body Water in High- and Low-Potassium-Type Marwari Sheep,
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Stochastic Characteristics of Particle Movement over a Dune Bed,
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Process for Removing Molybdenum from Aqueous Industrial Effluents and for Reducing the Level of Available Molybdenum in Soils in Areas of Molybdenum Toxicity,
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Water Recreational Activities in New York State and the Effect on Associated Industries,
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DPW for Feed, Shortcomings as Feed Ingredient,
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Agricultural Waste Utilization Versus Disposal,
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National Report on the Status of Canadian Water Resources Activities and Development,
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Data Collection Systems and Their Impact on the Future Development of Hydrology,
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Four Years of Tap Water Fluoridation in Kolobrzeg, (In Polish),
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Catfield, Ludham, and Potter Heigham Sewerage and Sewage Purification Works,
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Status of Water Resources Activities and Development in Malaysia,
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Groundwater Resources and Potential Sewage Pollution in Southern Spokane County,
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Petroleum-Derived and Indigenous Hydrocarbons in Recent Sediments of Lake Zug, Switzerland,
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A Numerical Study of Clearing Warm Fog by Using Hygroscopic Seeding in Conjunction with Helicopter Downwash,
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Health Aspects of Arsenicals in the Environment,
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Two-Tube Method for Screening Water Isolates for Salmonella,
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Costs of Construction of Publicly-Owned Wastewater Treatment Works. 1973 'Needs' Survey.
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ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C. (ASSIGNEE)
Removal of Mercury from Mercury Cathode Sludge,
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ESSEX RIVER AUTHORITY (ENGLAND).
Legislation Controlling Waste Disposal,
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FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, CINCINNATI, OHIO. DIV. OF POLLUTION SURVEILLANCE.
Analysis of Nonionic Detergents in Raw Surface Waters by Thin-Layer Chromatography and Infrared Spectroscopy,
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FOOD AND DRUG ADMINISTRATION, WASHINGTON, D.C.
Rule Making on Polychlorinated Biphenyls,
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A Method for the Determination of Toxicity to Bacteria of Pollutants in Water and Effluent, (In German),
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FREIBURG UNIV. (WEST GERMANY). CHEMISCHES LABORATORIUM.
Thermometric and Conductometric Observation of Copper (II) - Catalyzed Reactions in the Catalytic-Kinetic Difference Method-Determination of Microgram Amounts of Copper (II),
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A Guide to Statistical Methods for the Analysis of Samples of Benthic Invertebrates, (in French),
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Mercury and Organochlorine Residue Analysis of Fish and Aquatic Mammals,
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A Computer-Aided Design System for Service Reservoirs,
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Making Pollution Control Easier: Part 2 - Water Treatment and Control,
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The Quality of Surface Waters In Texas,
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Water Wells and Springs in the Eastern Part of the Upper Santa Margarita Watershed, Riverside and San Diego Counties, California,
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Quality of Surface Waters of the United States, 1969: Part 1. North Atlantic Slope Basins,
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Quality of Surface Waters of the United States, 1969: Parts 4 and 5. St. Lawrence River Basin and Hudson Bay and Upper Mississippi River Basins,
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Quality of Surface Waters of the United States, 1969: Part 11. Pacific Slope Basins in California,
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Quality of Surface Waters of the United States, 1969: Parts 12-16. North Pacific Slope Basins, Alaska, Hawaii, and other Pacific Areas,
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Computer Simulation of Solute Concentrations and Loads in Streams,
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A Conceptual Model of the Hydrologic System Supplying the Large Springs in the Ozarks,
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Phosphorus, Iron, and Manganese Distribution in Sediment Cores of Six Wisconsin Lakes,
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Compilation of Streamflow Records, Helmand River Valley and Adjacent Areas, Afghanistan, 1961-68,
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Nitrogen Movement Resulting from Surface Application of Liquid Sewage Sludge,
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Biodegradation of Chlorinated Organic Compounds,
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GEORGIA INST. OF TECH., ATLANTA. SCHOOL OF GEOPHYSICAL SCIENCES.
Organic and Inorganic Geochemistry of Some Coastal Plain Rivers of the Southeastern United States,
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GEORGIA STATE UNIV., ATLANTA.
Recreation: Economic Development Impact and Seasonality: Comment,
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GEORGIA UNIV., ATHENS. DEPT. OF POULTRY SCIENCE.
What to do About Poultry's Protein-Energy Crisis,
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GORE AND STORRIE LTD., TORONTO (ONTARIO).
Phosphorus Removal Costs,
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GOSUDARSTVENNYI GIDROLOGICHESKII INSTITUT, LENINGRAD (USSR).
The Role of Hydrology in Economic and Social Development, (Rol Gidrologii v Ekonomicheskom. I. Sotsialnom Razvitii),
W75-02479 2A

GOSUDARSTVENNYI NAUCHNO-ISSLEDOVATELSKII INSTITUT OZERNOGO I RECHNOGO RYBNOGO KHOZYAISTVA, LENINGRAD (USSR).
Feeding of the Roach Rutilus Rutilus (L.) When Carp Cyperinus Carpio are Fed Artificial Food in Lakes, (In Russian),
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GOUCHER COLL., BALTIMORE, MD. DEPT. OF BIOLOGICAL SCIENCES.
Thermal Effects on the Connecticut River: Phycology and Chemistry,
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GOVIND BALLABH PANT UNIV. OF AGRICULTURE AND TECHNOLOGY, PANTNAGAR (INDIA). DEPT. OF SOIL SCIENCE.
Internal Leaf Water Status and Transport of Water in Rice Plants,
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GULF SOUTH RESEARCH INST., NEW ORLEANS, LA. DEPT. OF ANALYTICAL CHEMISTRY.
Direct Determination of Zinc in Sea-Bottom Sediments by Carbon Tube Atomic Absorption Spectrometry,
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GUTTERIDGE, HASKINS AND DAVEY PTY LTD., MELBOURNE (AUSTRALIA).
Urban Water Use in Australia,
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HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
Thermal Effects of Projected Power Growth: The National Outlook,
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HAWAII STATE DEPT. OF AGRICULTURE, HONOLULU.
Hawaii, Island of Hope for Pork Industry,
W75-02330 5D

HAWAII STATE DEPT. OF HEALTH, HONOLULU.
Basic Requirements of Hog Pen Construction and Liquid Manure Disposal,
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HAWAII UNIV., HONOLULU. DEPT. OF AGRICULTURAL ENGINEERING.
Skewness and Kurtosis Influence on Uniformity Coefficient, and Application to Sprinkler Irrigation Design,
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HAWAII UNIV., HONOLULU. DEPT. OF ANIMAL SCIENCE.
Swine Waste Disposal and Control,
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HAWAII UNIV., HONOLULU. DEPT. OF CHEMISTRY.
The Separation of Mercury from Sea Water by Adsorption Colloid Flotation and Analysis by Flameless Atomic Absorption,
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HAWAII UNIV., HONOLULU. SEA GRANT PROGRAM.
The Feasibility of Brine Shrimp Production on Christmas Island,
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HAWAII UNIV., HONOLULU. WATER RESOURCES RESEARCH CENTER.
Return Irrigation Water in Hawaii,
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HELSINKI CITY WATERWORKS (FINLAND).
Glucose-14 Uptake in Lake Hiidenvesi,
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HOCHSCHULE FUER BODENKULTUR, VIENNA (AUSTRIA). INSTITUT FUER FORSTLICHE STANDDARTSFORSCHUNG.
Mineral Nutrition and Water Relations of Freshly Transplanted Spruce, (In German),
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Water Treatment: How to Top Even Government Standards,
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The Silver Flowe: I. Some Structural and Hydrological Features of Brishie Bog and Their Bearing on Pool Formation,
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HYDROLOGIC ENGINEERING CENTER, DAVIS, CALIF.
Hydrologic Engineering Methods for Water Resources Development. Volume II. Water Quality Determinations,
W75-02283 5C

HYDROMATION FILTER CO., LIVONIA, MICH. (ASSIGNEE)
Method of Filtering,
W75-02717 5D

HYDRONAUTICS INC., LAUREL, MD.
Concept Design and Cost Analysis of Restricted Draft Dry Bulk Carriers,
W75-02618 6B

IDAHO UNIV., MOSCOW.
The Effects of Limited Aeration on the Odors of Liquid Dairy Manure,
W75-02245 5D

ILLINOIS STATE NATURAL HISTORY SURVEY, URBANA. AQUATIC BIOLOGY SECTION.
A Survey of the Mussels (Unionacea) of the Illinois River: A Polluted Stream,
W75-02267 5C

ILLINOIS UNIV., URBANA. DEPT. OF HORTICULTURE.
Construction of Welded 'Wet Loop' Thermocouple Psychrometer Junctions,
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INDIAN AGRICULTURAL RESEARCH INST., NEW DELHI.
The Influence of Rainfall on the Yield on Rain-Fed Rice at Karjat (Colaba District),
W75-02714 2I

INDIAN INST. OF TECH., KHARAGPUR. DEPT. OF AGRICULTURAL ENGINEERING.
Influence of Soil Water Conditions on Growth and Root Porosity of Rice,
W75-02662 2G

INDIAN INST. OF TECH., KHARAGPUR (INDIA). DEPT. OF AGRICULTURAL ENGINEERING.
Influence of Subsurface Barrier on Growth, Yield, Nutrient Uptake, and Water Requirement of Rice, (Oryza sativa),
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INDIAN STANDARDS ASSOCIATION, NEW DELHI. TECHNOLOGICAL COMMITTEE NO 113.
Prospects of Hydrometry in the Light of Modern Technology,
W75-02475 2A

INDONESIAN INST. OF SCIENCES, DJAKARTA.
Present Status of Water Resources Development in Indonesia,
W75-02447 2A

INSTITUT ROYAL DES SCIENCES NATURELLES DE BELGIQUE, BRUSSELS.
Ecological Study Comparing the Populations of Ostracoda in Two Fish-Breeding Ponds in Upper Belgium, (In French),
W75-02272 2H

INSTITUT SCIENTIFIQUE ET TECHNIQUE DES PECHES MARITIMES, NANTES (FRANCE). LABORATOIRE DE GEOLOGIE MARINE.
Study of Fine Material in Suspension in the Estuary of the Loire and its Dynamic Grading,
W75-02387 2L

INSTITUT ZA BOTANIKU, ZAGREB (YUGOSLAVIA).
Two New Vegetal Associations from the Samoborsko Gorje Region, (In Croatiau),
W75-02545 4D

INSTITUTE OF OCEANOGRAPHIC SCIENCES, BIRKENHEAD (ENGLAND).
Non-Linear Waves in the Nearshore Region: Shoaling and Set-Up,
W75-02386 2L

A Non-Linear Theory of Longshore Currents,
W75-02390 2L

INSTITUTE OF OCEANOGRAPHIC SCIENCES, TAUNTON (ENGLAND).
The Salt Balance in Stratified Estuaries,
W75-02388 2L

INSTITUTE OF PLANT ENVIRONMENT, SUWON (REPUBLIC OF KOREA).
Survey on Water Pollution in Korea, (In Korean),
W75-02586 5C

INSTITUTE OF PUBLIC UTILITY SERVICES, WARSAW (POLAND).
Prospects of Faunal-Ecological Investigations on Active Sediment,
W75-02581 5D

INSTITUTO DE BIOLOGIA MARITIMA, LISBON (PORTUGAL).
Changes in the Branchia of the Oysters of the Sado and Tajo Estuaries (1971 and 1972), (In Portuguese),
W75-02525 2L

INSTITUTO NACIONAL DE LIMNOLOGIA, SANTO TOME (ARGENTINA).
The Main Chemical and Physical Characteristics of the Waters of the Upper Parana and Lower Paraguay Rivers, (in Spanish),
W75-02518 2K

Potassium Sources in the Middle Parana and Lower Paraguay Rivers,
W75-02643 5B

INSTITUTUL DE MEDICINA SI FARMACIA, IASI (RUMANIA).
Application of the A-Z Test in Investigations on the Influence of Wood Industry Residues Upon Water Autopurification Processes, (In Rumanian),
W75-02640 5C

INSTITUTUL DE MEDICINA SI FARMACIE, BUCHAREST (RUMANIA).
Fecal Pollution of Marine Water, (In Rumanian),
W75-02654 5C

INSTRUMENTATION CENTER, WASHINGTON, D.C.
Laboratory Evaluation of Dissolved Oxygen Analyzers,
W75-02368 5A

INTERNATIONAL HYDROLOGICAL DECADE, LISBON (PORTUGAL). PORTUGUESE NATIONAL COMMITTEE.
Reclamation of Water Resources in Portugal,
W75-02462 2A

INTERNATIONAL HYDROLOGICAL DECADE, STOCKHOLM (SWEDEN). SWEDISH NATIONAL COMMITTEE.
Water Resources, Water Use and Water Administration in Sweden,
W75-02464 2A

INTERNATIONAL INST. OF TROPICAL AGRICULTURE, IBADAN (NIGERIA).
Soil Temperature, Soil Moisture and Maize Yield from Mulched and Unmulched Tropical Soils,
W75-02227 3F

IOWA STATE DEPT. OF HEALTH, DES MOINES.
Iowa Water Pollution Control Commission,
W75-02341 5G

IOWA STATE UNIV., AMES. DEPT. OF AGRICULTURAL ENGINEERING.
Some Chemical and Physical Aspects of Phosphate Precipitation From Anaerobic Liquors Derived from Animal Waste Treatment Lagoons,
W75-02252 5D

JAWAHARLAL NEHRU AGRICULTURAL UNIV., JABALPUR (INDIA).
Hydrodynamic Dispersion in Unsaturated Porous Media: I. Concentration Distribution During Dispersion,
W75-02529 2K

JOHNS HOPKINS UNIV., BALTIMORE, MD. DEPT. OF GEOGRAPHY AND ENVIRONMENTAL ENGINEERING; AND JOHNS HOPKINS UNIV., BALTIMORE, MD. DEPT. OF POLITICAL ECONOMY.
The Role of User Fees and Congestion Tolls in the Management of Inland Waterways,
W75-02661 6C

KAISER ALUMINUM AND CHEMICAL CORP., OAKLAND, CALIF.
Sampling Device,
W75-02577 5A

KANSAS AGRICULTURAL EXPERIMENT STATION, MANHATTAN. EVAPOTRANSPIRATION LAB.
Rainout Shelter and Drainage Lysimeters to Quantitatively Measure Drought Stress,
W75-02418 2D

KANSAS STATE UNIV., MANHATTAN. DEPT. OF CHEMICAL ENGINEERING.
Evaluation of Methods for Estimating Stream Water Quality Parameters in a Transient Model from Stochastic Data,
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Feedlot Manure and Other Agricultural Wastes as Future Material and Energy Resources: III. Economic Evaluations.
W75-02588 5E

Effect of Suspended Wastes on System Design,
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Effects of Suspended Solids on Primary Clarifier Size Optimization,
W75-02685 5D

KANSAS UNIV., LAWRENCE. DEPT. OF SYSTEMATICS AND ECOLOGY.
Relationship Between Nutrient Concentration, Phytoplankton Density, and Zooplankton Density in Nutrient Enriched Experimental Ponds,
W75-02515 2H

KENTUCKY UNIV., LEXINGTON.
Priorities in Selecting Dairy Facilities,
W75-02246 5D

KENTUCKY UNIV., LEXINGTON, DEPT. OF ECONOMICS.
Regression Analysis Applied to the Wastewater Treatment Field,
W75-02687 5D

KENTUCKY UNIV., LEXINGTON. DEPT. OF SOCIOLOGY.
An Interpretative Analysis of Family and Individual Economic Costs Due to Water Resource Development,
W75-02635 6B

KERNFORSCHUNGSZENTRUM, KARLSRUHE (WEST GERMANY). INSTITUT FUR ANGEWANDTE SYSTEMTECHNIK UND REAKTORPHYSICK.
Theoretical Modeling Investigation for Self-Purification of Rivers (Modelltheoretische Untersuchungen iur Selbstreinigung von Fliess Gewassern),
W75-02505 5C

KOBE UNIV. (JAPAN). FACULTY OF AGRICULTURE.
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Effect of Excessive Soil Moisture Content on the Rate of Growth Processes of the Main and Lateral Shoots of Barley, (In Russian),
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KOPPERS CO., INC., PITTSBURGH, PA. ENVIRONMENTAL SYSTEMS DIV.
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Influence of Nitrogen, Phosphorus, and Plant Population on Yield and Quality of Forage Corn,
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Status of Water Resources Activities and Development in Sri Lanka,
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Tubificids Alter Profiles of Redox Potential and pH in Profundal Lake Sediment,
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Power Requirements of a Compost Channel for Animal Wastes,
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Screening Model for Storm Water Control,
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MAX-PLANCK-INSTITUT FUER LIMNOLOGIE, SCHLITZ (WEST GERMANY). LIMNOLOGISCHE FLUSSSTATION.
Gammarus Fossarum Koch as a Fallen Leaf Decomposer in Forest Streams: Schlitz Production Biological Studies (5). (In German),
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Phytoplankton in Two Ponds in Kathmandu Valley (Nepal),
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The Movement of Effluent from the City of Miami Sewage Ocean Outfall,
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Allochthonous Organic Carbon of a Marl Lake,
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Responses of Phosphorus Limited Lake Michigan Phytoplankton to Factorial Enrichments with Nitrogen and Phosphorus,
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Effect of Porous Rootzone Materials Underlined with Plastic on the Growth of Creeping Bentgrass (Agrostis palustris HUDs),
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MINISTRY OF AGRICULTURE, JERUSALEM (ISRAEL). HYDROLOGICAL SERVICE.
A Survey of Water Resources Development, Utilization and Management in Israel,
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MINISTRY OF IRRIGATION AND POWER, NEW DELHI (INDIA).
Status of Water Resources Activities and Development in India,
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MINISTRY OF WATER AND POWER, TEHRAN (IRAN).
Water Resources Development in Iran,
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MINISTRY OF WATER DEVELOPMENT AND POWER, DAR ES SALAAM (TANZANIA).
Status of Water Resources Activities and Development in Tanzania,
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MINISTRY OF WORKS AND DEVELOPMENT, CHRISTCHURCH (NEW ZEALEAND). WATER AND SOIL DIV.
Report on Water Resources Activities in New Zealand,
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Economic Design of Low Pressure Air Piping Systems,
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Housing and Shelter for Feedlot Cattle,
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Performance of Feedlot Runoff Control Systems in Minnesota,
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Influence of Fertilizer Placement on Yield Response of Soybeans,
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Expectations, Variances, and Sensitivity of Net Returns from Corn Fertilization Experiments,
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MODINE MFG. CO., RACINE, WIS.
Conduit with Internal Drain,
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Feeding of the River Form of the Muksun Coregonus Muksun (Pallas) of the Lena River in Connection with Some Characteristics of its Morphology, (In Russian),
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MOSCOW STATE UNIV. (USSR). DEPT. OF ICHTHYOLOGY.
Data on the Ecology of the Northern Pike Esox Lucius L. of the Lower Umba River, (in Russian),
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Some Physical Properties of Fractions of Mechanical Elements of Yellow Soils in the Humid Subtropical Zone, (In Russian),
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The Building of a Feedlot,
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Kentucky Lake Commercial Catfish Catch Analysis,
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MUSEUM NATIONAL D'HISTOIRE NATURELLE, PARIS (FRANCE). LABORATOIRE DES PECHES OUTRE-MER.
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Separation of Iron (III), Cobalt (II) and Nickel (II) by Paper Chromatography,
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The Status of Kenya's Water Resources and Their Development,
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Radiometry of Water Turbidity Measurements,
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The Dual Functioning Swirl Combined Sewer Overflow Regulator/Concentrator,
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NATIONAL ENVIRONMENTAL RESEARCH CENTER, CINCINNATI, OHIO. ADVANCED WASTE TREATMENT RESEARCH LAB.
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Effect of Soil Moisture After Young Panicle Formation Stage on Protein, Fat and Ash Contents in Lowland Brown Rice, (In Japanese),
W75-02539 2G

NATIONAL INST. OF SCIENTIFIC RESEARCH, QUEBEC.
Problematic Considerations of Aquatic Weed Control (Analyse de la problematique du controle de la vegetation aquatique),
W75-02578 2I

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ROCKVILLE, MD. OFFICE OF COASTAL ZONE MANAGEMENT.
Bibliography of the New York Bight, Part 1 - List of Citations.
W75-02393 10C

Bibliography of the New York Bight, Part 2 - Indexes.
W75-02394 10C

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SEATTLE, WASH. PACIFIC OCEANOGRAPHIC LABS.
Freshwater Input to Coastal Waters off the Pacific Northwest,
W75-02497 2E

NATIONAL POLLUTION CONTROL COMMISSION, MANILA (PHILIPPINES).
Status of Water Resources Activities and Development,
W75-02470 6B

NATIONAL WEATHER SERVICE, LEXINGTON, KY.
Quantitative Soil Moisture Use in Corn Grown Under Conventional and No-Tillage Methods,
W75-02406 3F

NATIONAL WEATHER SERVICE, SILVER SPRING, MD.
Trends in Hydrological Analysis,
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NATIONAL WEATHER SERVICE, SILVER SPRING, MD. OFFICE OF HYDROLOGY.
A Dynamic Model of Stage-Discharge Relations Affected by Changing Discharge,
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NATURAL ENVIRONMENT RESEARCH COUNCIL, LONDON (ENGLAND). SCIENTIFIC AND TECHNICAL SERVICES.
Some Recent Water Resources Activities in the United Kingdom,
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NATURAL RESOURCES AUTHORITY, AMMAN (JORDAN).
Effect of Oil Refinery Effluent on the Shallow Gravel Aquifer in Zerqa Area-Jordan,
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NATURE CONSERVANCY, BANCHORY (SCOTLAND).
The Specialized Feeding Behavior of Ambystoma Gracile in Marion Lake, British Columbia,
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The Mesoscale Distribution of Rainfall in California Rainstorms,
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A Model for a Climatology of the Potential of Ice-Phase Modification of Convective Clouds,
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NEBRASKA UNIV., LINCOLN. DEPT. OF AGRICULTURAL ENGINEERING.
Operational Characteristics of Meat Animals, Part II-Beef,
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Livestock Waste Management Systems Design and Operation,
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NEGEV INST. FOR ARID ZONE RESEARCH, BEERSHEBA (ISRAEL).
Removal of Nitrates from Potable Water by Ion Exchange,
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NEVADA UNIV., RENO. DESERT RESEARCH INST.
Variation of Snowpack Density and Structure with Environmental Conditions,
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Effect of Irrigation Management on Soil-Water Relationships in Stratified Soils,
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An Automated Method for the Determination of Arsenic and Antimony,
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NEW HAMPSHIRE WATER SUPPLY AND POLLUTION CONTROL COMMISSION, CONCORD.
Algae Control by Mixing,
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NEW JERSEY COLL. OF MEDICINE AND DENTISTRY, NEWARK. DEPT. OF PREVENTIVE MEDICINE AND COMMUNITY HEALTH.
Environmental Contrasts: Blood Lead Levels of Children in Honolulu and Newark,
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NEW JERSEY DEPT. OF ENVIRONMENTAL PROTECTION, TRENTON. DIV. OF FISH, GAME AND SHELLFISH.
Inventory of Major Estuarine Systems in New Jersey,
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NEW MEXICO STATE UNIV., CLOVIS. PLAINS BRANCH AGRICULTURAL EXPERIMENT STATION.
Effect of Antitranspirants on Yield of Grain Sorghum Under Limited Irrigation,
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NEW MEXICO STATE UNIV., UNIVERSITY PARK. DEPT. OF AGRICULTURAL ECONOMICS.
Coase Externality Theory in a Policy Context,
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Phosphate Removal by Algal Systems,
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NEW SOUTH WALES DEPT. OF AGRICULTURE, GLENFIELD (AUSTRALIA). VETERINARY RESEARCH STATION.
Drought Feeding of Sheep: III. The Relative Importance of Components of Wool Growth in Explaining the Wool Growth Differences Between Strains and Diet,
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Daily Transpiration Rates of Radiata Pine,
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The Significance of Geology in Some Current Water Resource Problems, Canterbury Plains, New Zealand,
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Horizontal Flow in Hydrothermal Systems,
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NEWARK COLL. OF ENGINEERING, N.J. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Water Pollution Sampling, Monitoring and Analysis Instrumentation,
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Poultry Waste Management Alternatives,
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NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF BIOLOGICAL AND AGRICULTURAL ENGINEERING.
Water Table Movement During Subirrigation,
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The Use of Volatile Fatty Acids for the Control of Microorganisms in Pine Sawdust Litter,
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The Fate of Fertilizer Nutrients as Related to Water Quality in the North Carolina Coastal Plain,
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NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF ZOOLOGY.
Nutrients and Eutrophication in the Pamlico River Estuary, N.C. 1971-1973,
W75-02353 5C

NORTH CAROLINA UNIV., MOREHEAD CITY. INST. OF MARINE SCIENCES.
Structure and Functioning of Estuarine Ecosystems Exposed to Treated Sewage Wastes, III. 1971-1972,
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NORTH DAKOTA STATE UNIV., FARGO. DEPT. OF AGRICULTURAL ENGINEERING.
The Effect of Low Volume and High Volume Aeration on a Hog Lagoon,
W75-02668 5D

NORTH STAR RESEARCH AND DEVELOPMENT, MINNEAPOLIS, MINN.
Portable Device to Measure Industrial Wastewater Flow,
W75-02213 5A

NORWEGIAN WATER RESOURCES AND ELECTRICITY BOARD, OSLO. WATER RESOURCES DIV.
Water Resources Activities in Norway,
W75-02460 2A

NOTRE DAME UNIV., IND. DEPT. OF CIVIL ENGINEERING.
Complexation of Iron (II) by Organic Matter and its Effect on Iron (II) Oxygenation,
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OFFICE DE LA RECHERCHE SCIENTIFIQUE ET TECHNIQUE OUTRE--MER, FORT-LAMY (CHAD).
Application of Correlation Analysis to the Study of Certain Ichthyological Populations of Lake Chad, (In French),
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OFFICE OF THE CHIEF OF ENGINEERS (ARMY), WASHINGTON, D.C. CIVIL WORKS PLANNING DIV.
Recreation Surge,
W75-02641 6D

OFFICE OF THE CHIEF OF ENGINEERS (ARMY), WASHINGTON, D.C. PRESENTATIONS BRANCH.
Boston to Brownsville,
W75-02639 6D

OFFICE OF WATER RESEARCH AND TECHNOLOGY, WASHINGTON, D.C.
Report on Ninth Annual Water Resources Research Conference Sponsored by Office of Water Resources Research.
W75-02344 10A

OHIO STATE UNIV., COLUMBUS. DEPT. OF AGRICULTURAL ENGINEERING.
Gas Chromatographic Analysis of Odors from Dairy Animal Wastes,
W75-02591 5A

OKLAHOMA UNIV., NORMAN.
Use of the Nonpolar Analog Model in Inferring the Extent of Ordering Around Solute Molecules in Water,
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OKLAHOMA UNIV., NORMAN. DEPT. OF ZOOLOGY.
The In Situ Chemostat- A Self-Contained Continuous Culturing and Water Sampling System,
W75-02528 2H

OREGON FISH COMMISSION, PORTLAND. DIV. OF MANAGEMENT AND RESEARCH.
1971 Siuslaw River Estuary Resource Use Study,
W75-02609 6B

1971 Netarts Bay Estuary Resourch Use Study,
W75-02628 6B

Chetco and Rogue River Estuaries,
W75-02630 6B

OREGON STATE UNIV., CORVALLIS.
Douglas Fir Bark as a Trickling Filter Medium for Animal Waste Disposal Systems,
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OREGON STATE UNIV., CORVALLIS. DEPT. OF POULTRY SCIENCE.
Broiler Litter Management,
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OREGON STATE UNIV., CORVALLIS. SCHOOL OF OCEANOGRAPHY.
Temporal Variability of Suspended Matter in Astoria Canyon,
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OSLO UNIV. (NORWAY). DEPT. OF LIMNOLOGY.
A Bottom Sampler Which is Easy to Make,
W75-02743 7B

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Salt Tolerance of Chickpea Varieties During Germination,
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PEDAGOSKA AKADEMIYA, OSIJEK (YUGOSLAVIA).
Contribution to the Knowledge of Phytoplankton in the Protected Region of the Swampy Area of Kopachevo (Kopacki Rit), (In Croatian),
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PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF AGRICULTURAL ENGINEERING.
Nutrient Reduction in Wastewater by Grass Filtration,
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PLYMOUTH POLYTECHNIC (ENGLAND). DEPT. OF ENVIRONMENTAL SCIENCES.
The Life Cycle and Larval Growth of Drusus Annulatus Stephens (Trichoptera, Limnephilidae) in a Mountain Stream,
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POLISH ACADEMY OF SCIENCES, POZNAN. INST. OF ZOOLOGY.
Heteroptera of the River Raba, Some of its Tributaries and Riverine Reservoirs,
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POLISH ASSOCIATION OF SANITARY ENGINEERING AND TECHNOLOGY, WARSAW.
A Characterization of Radioactive Contamination of the Vistula River, (In Polish),
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The Use of Coagulation and Filtration in Radio-Contaminated Water Treatment, (In Polish),
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The Present State of Knowledge on Fluoridation of Potable Water in Poland, (In Polish),
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POLYARNYI NAUCHNO-ISSLEDOVATELSKII I PROEKTNYI INSTITUT MORSKOGO KYBNOGO KHOZYAISTVA I OKEANOGRAFII, MURMANSK (USSR).
Burbot Lota Lota (L.) in the Upper Tuloma Reservoir, (in Russian),
W75-02601 8I

POLYTECHNIC WOLVERHAMPTON (ENGLAND).
Spectroscopic Determination of Trace Elements in Sewage Sludges,
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PORT OF ROTTERDAM (NETHERLANDS).
Port Development in the European Economic Community,
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PRETORIA UNIV. (SOUTH AFRICA). DEPT. OF ZOOLOGY.
Water Use by the Kalahari Lion Panthera Leo Vernayi,
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PUNJAB AGRICULTURAL UNIV., LUDHIANA (INDIA). DEPT. OF SOILS.
Root Development and Growth Response of Corn Following Mulching, Cultivation, or Interrow Compaction,
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PURDUE UNIV., LAFAYETTE, IND. DEPT. OF AGRICULTURAL ENGINEERING.
Solids-Liquid Separation: An Important Step in the Recycling of Dairy Cow Wastes,
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A Mathematical Simulation of Environmental Control in Swine Buildings,
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PURDUE UNIV., LAFAYETTE, IND. DEPT. OF AGRONOMY.
Determination of Total Nitrogen in Plant Material,
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PURDUE UNIV., LAFAYETTE, IND. DEPT. OF BOTANY AND PLANT PATHOLOGY.
Brush Control Along Agricultural Drainage Ditches: Environmental Safety and Efficacy of Herbicide Formulations,
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PURDUE UNIV., LAFAYETTE, IND. SCHOOL OF CIVIL ENGINEERING.
Activated Sludge Hydraulic-Control Techniques Evaluation by Computer Simulation,
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RAJASTHAN AGRICULTURE DEPT., KOTA (INDIA).
Note on Effect of Presowing Irrigation on Production of Mexican Wheats in Chambal Commanded Area,
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RENSSELAER POLYTECHNIC INST., TROY, N.Y.
Direct Two-Phase Titration Method for Analyzing Anionic Surfactants in Fresh and Saline Waters,
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Phosphorus Removal from Wastewaters: A Cost Analysis,
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RENSSELAER POLYTECHNIC INST., TROY, N.Y. DEPT. OF ENVIRONMENTAL ENGINEERING.
Formulation of a Numbers-Biomass Model for Simulating the Dynamics of Aquatic Insect Populations,
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RENSSELAER POLYTECHNIC INST., TROY, N.Y. DEPT. OF GEOLOGY.
Statistical Analysis, Data Management and Ecosystem Modeling at Lake George, New York,
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RHODE ISLAND UNIV., KINGSTON. AGRICULTURAL EXPERIMENT STATION.
Factors Related to Beach Use,
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Hydrology and Water Resources Development,
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RIVKIN/CARSON, INC., WASHINGTON, D.C.
The Sewer Moratorium as a Technique of Growth Control and Environmental Protection.
W75-02617 5G

ROBERT S. KERR ENVIRONMENTAL RESEARCH LAB., ADA, OKLA.
Environment Protecting Concepts of Beef Cattle Feedlot Wastes Management,
W75-02593 5D

ROBERTSHAW CONTROLS CO., RICHMOND, VA.
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A. Centers of Competence		
Colorado State University, Irrigation Return Flow Quality	W75-02395 -- 02401 02403 -- 02408 02411 -- 02424 02426 -- 02428 02430 -- 02431 02709 -- 02711	35
Cornell University, Policy Models for Water Resources Systems	W75-02355 02678 -- 02680 02682 -- 02690	12
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B. State Water Resources Research Institutes		
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* U. S. GOVERNMENT PRINTING OFFICE : 1975 582-941/18

CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Illinois State Water Survey and the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

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